

INVESTIGATING THE PROFESSIONAL LIFE HISTORY OF UPPER ELEMENTARY
TEACHERS WHO SUCCESSFULLY FACILITATE EFFECTIVE SCIENCE TEACHING
BOTH WITHIN THE CLASSROOM AND IN THE OUTDOOR LEARNING
ENVIRONMENT.

by

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Chapter 1

Problem

Elementary science teachers in the early 21st century face a number of challenges and pressures to educate all children and leave none behind. A culture of high stakes testing encourages a system where measures of accountability for both students and teachers are the result of student performance on a standardized test on a single day in a year. Pressures by government or state funding and accountability systems encourage districts to utilize various means to ensure that students are performing in a quantitatively measurable fashion. Responses to these pressures vary among school districts. Large districts in North Texas provide a curriculum framework for teachers, some of which include precise timelines for content coverage (Dallas Independent School District, 2013; Fort Worth Independent School District, 2013). Administrators, responding to district pressures, often place demanding requirements on teachers for student performance, focusing on standardized test data. Teachers in North Texas (and in many other locations throughout the United States) are facing classrooms that are more and more diverse, with a majority of students who do not speak English in their homes (Banks et al., 2005; U.S. Census Bureau, 2011). The cumulative pressures and challenges placed upon early 21st century elementary educators highlight the need for expertise in curriculum planning and implementation, in classroom management, and in understanding of their students' individual and unique learning needs.

The knowledge base required of elementary science teachers is extensive. Science educators must have a thorough, clear, and conceptually accurate knowledge of ever-evolving science content and the nature of science (Davis, Petish, & Smithey, 2006; Ginns & Watters, 1999; Grossman, Schoenfeld, & Lee, 2005; Moreno & Erdmann, 2010; National

Research Council, 1996). The challenges to attain and maintain content knowledge continues to grow for elementary educators who must teach all areas of science content (Davis & Smithey, 2009) regardless of their experience level (Davis et al., 2006). Beyond a knowledge of science content, educators must have a proficient pedagogical content knowledge that aids in the understanding of how students learn, where they struggle, and how best to facilitate an understanding of content (Grossman et al., 2005; Harlen, 1999; National Research Council, 1996; Shulman, 1987). The effective elementary teacher facilitates a productive classroom environment that promotes socialization and community (Davis et al., 2006; Dewey, 1997; Hammerness et al., 2005), establishes routines of multiple activity that to the observer seem like “disorganized chaos” (Hammerness et al., 2005, p. 361), and responds to the needs of multiple learners at various levels (Davis et al., 2006; Hammerness et al., 2005; Harris & Rooks, 2010; Moreno & Erdmann, 2010) by monitoring student needs and appropriately managing the classroom environment (Hammerness et al., 2005; Harlen, 1999; Harris & Rooks, 2010).

Current science education theory and reform calls on educators to facilitate a constructivist classroom where students develop their own understandings, ask relevant questions, express insight and ideas, and participate in the planning of investigations (Bransford, Derry, Berliner, Hammerness, & Beckett, 2005; Davis et al., 2006; Ginns & Watters, 1999; Harlen, 1999). A constructivist learning environment requires planning, tools, and practices that deepen student learning. Assessing student learning requires the teacher to encourage higher-order thinking of his or her students using open-ended questioning and formative assessments that allow students to truly demonstrate understanding (Bransford, et al., 2005; Grossman et al., 2005; Harlen, 1999). Constructivist science classroom students

rarely complete recitation tasks or “seatwork.” Instead, these students are engaged in learning through investigations and scientific practice (Davis et al., 2006; Harlen, 1999; Harris & Rooks, 2010).

Natural experiences are critical to children’s development in cognitive and affective domains (Martin, 2003; Rivkin, 1997; Thorp & Townsend, 2001) and can provide opportunities for learning situated in real experience, where students engage all five of the senses and work collaboratively to construct an understanding of the world (Klemmer, Waliczek, & Zajicek, 2005; Ozer, 2007; Wagner, 2010). These theories regarding natural experiences for students encourage the use of outdoor learning spaces in education (Klemmer et al., 2005). Outdoor spaces in schools can include everything from pathways to play structures and from gardens to fields (Wagner, 2010). An increase in enthusiasm for outdoor learning environments in schools has risen in the United States over the last 20 years (Ozer, 2007; Robinson-O’Brien, Story & Heim, 2009; Wagner, 2010) especially in areas of science education (Cronin-Jones, 2000).

With the pressures created by state and national achievement tests, outdoor learning environments have to push against a “back to basics” mentality and calls for a universal curriculum (Thorp & Townsend, 2001). Gardens and outdoor learning spaces provide opportunities for hands-on inquiry in multiple content areas within state-mandated objectives (Dyment, 2005; Ozer, 2007) that have been found to increase academic achievement (Klemmer et al., 2005; Lieberman & Hoody, 1998; Skelly & Bradley, 2007; Thorp & Townsend, 2001). Adding the component of an outdoor learning environment to a school has shown to positively impact the culture of the school (Ozer, 2007; Thorp & Townsend, 2001) and potentially extend or strengthen the ties between school and community (Dyment, 2005;

Ozer, 2007). Students and teachers both feel connected to their environment and achieve a sense of control (Dyment, 2005; Thorp & Townsend, 2001) that can impact behaviors and attitudes regarding science, environmental and sustainability concerns, and the status of food (Ozer, 2007; Skelly & Bradly, 2007; Thorp & Townsend, 2001).

The accessibility of the schoolyard as an outdoor learning environment allows for the repeated and consistent use of the outdoors for teaching. More frequent experiences can have a deeper impact on learning than one-time visits to off-campus natural areas (Martin, 2003). However, many elementary teachers ignore the possibilities for learning in their schoolyard (Cronin-Jones, 2000). A long list of challenges and reservations inhibits the interested teachers' use of the outdoors for teaching (Blair, 2009; Dyment, 2005; Foran, 2005; Greensfeld & Elkad-Lehman 2007; Murakami, Stuart, Witzig & Waldron, 2012), and teacher-training programs often fail to address these challenges or stress the importance of outdoor educational experiences (Tal & Morag, 2009).

The knowledge, tools, and practices of effective elementary science teachers are not easily acquired, and they are not fully developed in pre-service training (Grossman et al., 2005; Hammerness et al., 2005). What the science teacher does beyond pre-service training helps him or her to become a master teacher. It is difficult for the educator to stay current with a content that is always changing and evolving when professional development opportunities are not often readily available (Moreno & Erdmann, 2010). The effective teacher is one who maintains a disposition of the "life-long learner," adapts to experience and community, and generates confidence in his or her understanding of content and pedagogical practice (Grossman et al., 2005; Hammerness et al., 2005; Harlen, 1999).

The challenges of both in-class and outdoor education have been well documented. The literature addresses the questions of facilitating an effective classroom teacher. However, very little research responds to the successes of the teacher who demonstrates effectiveness in the outdoor learning environment. Therefore, it is important to understand the professional life history of the teacher who becomes effective both within the four walls of the classroom and the outdoor learning environment of the schoolyard.

Question

It is not common practice for pre-service teacher education programs to focus on the tools and practices required of teachers to use the outdoor learning environment as an integrated tool for science teaching. Although school gardens and “greening” of school grounds have increased in popularity, teachers still frequently have little to no training addressing how to utilize these spaces for science teaching. Yet, some teachers not only generate effective science instruction within their classrooms but also extend teaching and learning into the schoolyard.

The focus of this research is upper elementary science teachers who demonstrate successful and effective teaching both in the classroom and the outdoor learning environment. This research addresses the professional experiences of such teachers in an attempt to identify both the uniqueness and the similarity in their narratives of experience. The purpose of this study is to investigate the narratives of the professional life histories of upper elementary teachers who successfully facilitate effective science teaching both within the classroom and in the outdoor learning environment.

Definitions

For the purpose of this study, it is important to clarify the intended definition of terms used throughout by the participants as well as by myself, the researcher. Those definitions appear below:

Upper Elementary Science teacher

An upper elementary science teacher is a public school teacher who teaches in grades three, four, or five. This teacher instructs students on the content of science a minimum of three hours a week per class taught.

Effective

The effective teacher is one who meets the criteria as understood by administrators and educators from REAL School Gardens (RSG). To be effective in the outdoor learning environment, each teacher must, among other criteria, make frequent use of the outdoor learning environment for instruction that is integrated with regular science curriculum goals. In the classroom, the criteria for effectiveness include, but are not limited to, the use of inquiry methods for teaching, a strong content and pedagogical understanding, a constructivist classroom environment, the disposition of a life-long learner, and an involved member of a school community.

Classroom

A classroom is any location within the school building where general, science education occurs, such as a teacher's homeroom or a school science lab.

Outdoor Learning Environment (OLE)

The outdoor learning environment (OLE) is any outdoor space on school property that students and teachers have access to regularly. Such a space can include a school garden,

fields, neighboring parks, streams, or creek beds. This definition does not include any location that requires field-trip approval or additional chaperones for teacher use.

Title I

Governmental funding provided to state and local education agencies as resources for schools with high concentrations of students from low-income families (Texas Education Agency, 2014).

Homeroom teacher

In the elementary school setting, the homeroom teacher generally spends the most time in a school day with his or her students and is accountable for attendance, testing, as well as other instructional duties.

Self-contained

A self-contained classroom is one in which a single teacher is responsible for teaching the content of science, mathematics, language arts, and social studies. Additional academic content may also be included.

Garden coordinator

In the context of this research, a garden coordinator is an individual staff-member of an RSG partner campus (generally a classroom teacher) who acts as a liaison between RSG and campus faculty and staff.

Vision

Vision is the ideas of what is possible. A teacher's vision influences their instructional goals, future learning, and classroom practices.

Understanding

In this research, understanding refers to the participants' demonstrations regarding an assimilation of knowledge of content, curriculum, pedagogy, and children.

Tools

Tools are what teachers use to connect their vision, goals, and intentions with classroom pedagogy. Tools may be either conceptual or practical.

Practices

Practices are what the teacher does in the classroom or in preparation for the classroom. They are how teachers integrate understanding and tools.

Disposition

In this study, a disposition refers to an inherent quality of thought or inclination about teaching, learning, students, and the role of a teacher.

Community

In this research, community refers to the group of people or individuals and the contextual setting among which the participants learned to teach.

Chapter 2

This chapter has four major parts. The first describes the theoretical framework for the research. The second describes the theoretical framework of narrative inquiry and its place in the methodology of this research. Finally, the third and fourth address the current state of the literature regarding OLE pedagogy and a framework for teacher learning and development.

Theoretical Framework

Pragmatism. Pragmatism is a philosophy that values the transactions of experience between organism and environment. Interactions between the individual and his or her social, cultural, and historical context confirm ideas (beliefs). Once confirmed, ideas become “truths” that are fallible and malleable (Seigfried, 1999). Pragmatism was born from the ideas of Charles Sanders Peirce and extended in writings by William James (Dewey, 1970). Peirce’s conception of pragmatism was intended to (a) identify linguistic clarity (or more accurately, identify the difficulty of linguistic clarity) and (b) reconstruct meanings (Thayer, 1970). For Peirce, pragmatism is a method for ascertaining the meaning of “any concept, doctrine, proposition, word, or other sign” (Peirce, 1970, p. 51).

James extended Peirce’s writings on pragmatism and made statements such as, “Truth *happens* to an idea. It *becomes* true, is *made* true by events” (James, 1907/1981, p. 92). True ideas are the ones that we can integrate, the ones we can validate, the ones that work within our experiences. The key feature of this notion is the plurality. The statement loses meaning if each “we” is replaced with “I” and “our” replaced with “my.” What we know as true is not only a nature of our experiences, but also a social venture we enter into together that can be adjusted and altered as we gain experiences and construct new, better, understandings.

The goal of seeking knowledge is to discover a well developed sense of understanding of the world we live in *with others* that involves careful consideration of what truths we accept, the grounds of their acceptance, and their place in our reality that is social by nature. Knowledge seeking is a human endeavor as well as what gives us our humanity. “Knowledge emerges only through invention and re-invention, through the restless, impatient, continuing, hopeful inquiry human beings pursue in the world, with the world, and with each other” (Freire, 1970/2012, p. 72).

Social constructivism. Constructivism is a form of pragmatism that shares views regarding knowledge and truth and avoids the urge to grasp at a universal understanding or truth (von Glasersfeld, 1989). Constructivism describes the necessity of knowledge as an adaptive process, where understandings that are the most viable in the current context of the learner are those that become assimilated (Driver, 1995; von Glaserfeld, 1989; 1995). Building upon a Piagetian understanding of how individual knowledge is constructed, social constructivists emphasize and include the nature of social interactions with other “cognizing subjects” (von Glaserfeld, 1989, p. 126). The social, cultural, historical, and institutional contexts are considered as necessary for understanding the “key aspects of mental functioning” (Wertsch & Toma, 1995, p. 159).

The social construction of learning theory, imagined through the works of Rousseau, Pestalozzi, Bandura, Bruner, Dewey and others, describes learning as a social endeavor where students’ senses, observations, and experiences provide a filter through which learners co-construct understandings (Marlowe & Page, 2005). Dewey (1911/1998) emphasized meaningful experiences for education and that experience can only be valued based on “the perception of relationships or continuities to which it leads up” (p. 1033).

Vygotsky, possibly the most prevalent voice of the learning theory of social construction, posited that humans cannot master the world without others (Driver, Asoko, Leach, Scott, & Mortimer, 1994). Wertsch and Toma (1995) broke Vygotsky's writings into three general themes: (a) use of a developmental method for understanding, (b) social life is the root of mental functioning, and (c) humans "mediate" social and individual planes through tools and signs (p. 160). The genetic (developmental) method is essential to Vygotsky as a means of understanding mental functioning as an extension of its origin and the transitions such functions have undergone. For Vygotsky and other social constructivists the social dimension is the primary dimension. "The individual dimension of consciousness is derivative and secondary" (Weretsch & Toma, 1995, p. 161). The mediation of thought by individuals incorporates meaning making through interpretation of signs, symbols, and tools.

"Making meaning is thus a dialogic process involving persons in conversation" (Driver, et al., 1994, p. 7) where the symbolic world is represented through tools, such as language, and where listeners aim to match meaning with their own symbols and understandings (Wertsch & Toma, 1995). For Vygotsky, it is this mediation, the ascribing of meanings to signs and symbols, that illustrates why knowledge is constructed socially. The very act of including a symbol, such as a name, transforms thought so that it must be mediated through dialogue and conversation (Driver et al., 1994; Wertsch & Toma, 1995).

Knowledge is not static, but instead "truths are beliefs that are confirmed in the course of experience and are therefore fallible, subject to further revision" (Seigfried, 1999, p. 730). The experiences of this fluid knowledge are not in isolation or singular. "An experience is always what it is because of a transaction taking place between an individual

and what, at the time, constitutes his [or her] environment” (Dewey, 1938/1997, p. 43) including the topic, the people, the tools, or the materials.

“As individuals, we experience the world not as scientists, through a theoretical lens, but as persons who are trying to give meaning to our own unique or universal lived experiences” (Atkinson, 2007, p. 234). As I investigated the professional life histories of elementary science teachers, it is the accepted truths that participants described in their stories, the social venture illustrated within their stories, and the contexts of their assimilation of understandings that provided a framework of meaning within my data. Approaching this study through a framework of pragmatism and social constructivism allowed for me as researcher to look at the social, personal, and global contexts that allowed participants to make meaning from their experiences and in what ways those experiences impacted their professional life histories.

Methodological Framework

Narrative inquiry. Narrative inquiry is situated within a deep interest in life experiences and begins with what C. Wright Mills called the “trilogy of biography, history, and society” (as cited in Chase, 2011, p. 421). It is a method for describing human experience that is interested in the ways that language assists human beings in making meaning (Casey, 1995). Narrative exists in what Clandinin and Connelly (2000) described as a space defined by the three-dimensions of temporality, personal/social interaction, and situation. The intersubjective quality of narrative inquiry provides the opportunity for continuous reflection and communication between the self and other and creates a unique method for the inquiry into human life. Through the ongoing investigation into the stories of human experience in each of these three dimensions, Hones (1998) claimed we can discover a deeper

understanding of who we are. Mary Catherine Bateson wrote, “Human beings construct meaning as spiders make webs” (as cited in Ely, Vinz, Downing, & Anzul, 1997, p. 63). To make meaning of experiences it is helpful to reflect on and engage with interwoven stories of experiences, constructions of knowledge, and moments of understanding.

Worldview of narrative inquiry. To understand the worldview of narrative inquiry, it is important to look back towards the rejection of logical positivism by narrative inquirers. Logical positivism stems from the 1920s and is a philosophical system based on empiricism and verificationism (Fumerton, 1999). Those subscribing to a positivist philosophy believe that indispensable, objective “facts” can be used to create general, overarching statements and theories about the world and people (Freedman & Combs, 1996). According to positivism, any claims made about reality must be grounded in the “facts of experience” (Clandinin & Rosiek, 2007). This philosophy states that there are absolute truths within our reality that can be known through observable and measurable mediations of the senses.

Some post-positivist philosophers concluded that statements can in no way be verified as true, they can only be falsified (Stokes, 2002) and that it is necessary to develop tools and procedures to mediate experiences and identify a reality which we all share (Clandinin & Rosiek, 2007). It is no longer enough that claims be based on facts of experience, they must have stood through attempts of falsification. The still widely held notion remains that there are objective truths within a singular reality, and that humans have access to this knowledge. The shift from positivism to post-positivism occurs during a time where thinkers are moving towards postmodern thought concerned with *meaning* rather than *fact* (Freedman & Combs, 1996).

Postmodernism arises at a time when a social constructivist philosophy suggests that our social nature has an influence on our realities. Human meaning becomes described as tentative, altered as new information is gained (Clandinin & Rosiek, 2007). Views associated with social constructivism range from a belief that social factors influence our interpretations of the world (reality) to a belief that our realities consist entirely of socially constructed theories, practices, and institutions (Gasper, 1999). In essence, what we know and can know about our world is influenced and defined by the social nature of our existence and our interactions with our environment.

The convergence of these modes of thought defines a worldview that informs narrative theory. The narrative worldview accepts “world making,” or meaning making, as a main objective of thought (Bruner, 1987/2004; Hones, 1998). A singular, objective reality based on fact is not the focus of narrative inquiry. Rather, it is the idea that realities are socially constructed through language and maintained through story (Freedman & Combs, 1996). Investigating the stories that people tell about their lives provides an insight into how meaning is made from experiences. Approaching the world with the goal of making meaning of the realities constructed by individuals through their experiences with the world can provide unique understandings of “how power, knowledge, and truth are negotiated” (Freedman & Combs, 1996, p. 22).

At the foundation of the narrative worldview is the nature of experience. Dewey’s writings that describe experience as continuous personal and social interactions create the backdrop for narrative inquiry (Clandinin & Connelly, 2000). These experiences and our interpretations of them define who we are as humans and how we approach the world. Each past experience sets the stage for our current understandings, which lead to future

experiences. For the narrative inquirer, human experience is fundamental as the basis of our realities and the ontological category where inquiry begins (Clandinin & Rosiek, 2007).

The emphasis on the social nature of our existence is also essential to the narrative worldview. “The self is only a self by virtue of our involvement with others” (Larson, 1997, p. 459). The continuous interaction of human thought with our environment (personal, social, and material) defines our experience (Clandinin & Rosiek, 2007). Human knowledge is not created in isolation, it is produced through interactions. Knowledge is a result of a social process of questioning and exchanging ideas (Larson, 1997).

The temporality of knowledge generation is also emphasized in descriptions of the narrative worldview and is stressed as a move from the positivist trend. Experience is not static and fixed. Experiences do not happen as disjointed segments of time, but instead are continuous. As knowledge is gained through our experiences, this continuity creates an ever-changing understanding of our world. To think as a narrative inquirer is to understand that experiences and understandings are situated in a past, present, and implied future (Clandinin & Rosiek, 2007).

Narratives should remain open-ended, free to be re-interpreted by the inquirer, narrator, or reader at any time. Conle (2000) claimed this open-endedness and tentativeness of conclusion is much needed in our pluralist societies. Even further, she wrote that narrative can be a tool to illustrate this “temporal fluidity” within meaning making.

Social, temporal, and continuous experience becomes a form of personal knowledge used for decision-making, action, and reality—a way of understanding and interpreting the self (Conle, 2000; Hones, 1998). Personal experiences bring with them individual modes of telling and understanding that become a part of personal habit and eventually offer a way to

structure experience (Bruner, 1987/2004). This personal knowledge and meaning making is what is of interest to the narrative inquirer.

Stories, complete with plots, characters, times, and places, are the means through which individuals understand their lives (Hones, 1998). That “narrative imitates life, life imitates narrative” (Bruner, 1987/2004, p. 692) is widely echoed through the writings in narrative inquiry (Carter, 1993; Clandinin & Connelly, 2000; Conle, 2000; Connelly & Clandinin, 1990; Drake, 2006; Errante, 2000; Larson, 1997; Pinnegar & Daynes, 2007; Polkinghorne, 1995). Clandinin and Connelly (2000) wrote, “Life is filled with narrative fragments, enacted in storied moments of time and place, and reflected upon and understood in terms of narrative unities in discontinuities” (p. 17). The stories that individuals form and tell are a mode of interpreting new ideas and experiences and create a guide for future action and decision making (Carter, 1993; Drake, 2006).

This storied mode of thought helps to organize knowledge at both the individual and social level (Conle, 2000) and generates narratives of identity—representations of reality (Errante, 2000). The ancient practice of the autobiographical narrative is the only way we can fully enter another’s life (Larson, 1997). The interpretation of the lived life communicated through story includes the descriptions of events and the understandings gleaned from them (Bruner, 1987/2004).

Defining narrative inquiry. Forms of narrative research include autobiographies and biographies, life writing, personal narratives, narrative interviews, personal documents, documents of life, life stories, life histories, oral history, ethnography, ethno-biographies, auto-ethnographies, popular memory and more (Casey, 1995; Connelly & Clandinin, 1990). The oral or written stories as well as their contexts are where narrative inquirers begin.

Narrative is a move away from more formalistic modes of inquiry and addresses boundary tensions regarding the role of theory, people, and the researcher (Clandinin & Connelly, 2000).

Pinnegar and Daynes (2007) identified four turns that narrative takes away from formalistic inquiry: (a) a change in the relationship between researcher and researched, (b) words rather than numbers as data, (c) focus on the local and specific rather than the general and universal, and (d) the acceptance of alternative ways of knowing (Pinnegar & Daynes, 2007, p. 7). The turns of narrative research represent philosophical turns from previous assumptions of validity, objectivity, reliability, and generalizability (Connelly & Clandinin, 1990; Pinnegar & Daynes, 2007).

For narrative researchers, the method requires a move from positivist, empiricist philosophical ideals. And, although the inquiry does not aim to provide the identification of an “unchanging transcendent reality” (Clandinin & Rosiek, 2007), it also should be careful not to add to what Conle (2000) called “rampant relativism” and the “rage against reason” (p. 56). The “truth” revealed in narrative study is closely tied to the context, character, contradiction, and complexity of the narrator (Carter, 1993) and may change as the inquiry progresses and/or is understood in new ways by the reader (Conle, 2000).

The turns described by Pinnegar and Daynes (2007) are not described as a rejection of the values of the general; but, an emphasis of the value of the particular. The particular nuances described through story-telling as well as the disparities or discontinuities are valuable to the construction of a narrative. Rather than focus on the rightness of a story, inquirers view personal narratives as intentional creations where both the accuracies and the

discrepancies provide insight into the meaning and the experience of the story-teller. This view, Larson (1997) claimed, makes “authenticity” a nonissue for narrative inquiry.

“Narrative research is deeply implicated in contemporary conflicts over theory, methodology, and politics in scholarly investigation” (Casey, 1995, p. 211). Empiricism and positivist demands on research can put pressures on narrative inquirers to attempt to make global or generalized statements of study subjects. Although the worldview of narrative inquirers is one of social construction and postmodern ideals, readers may approach research from a different stance. Without caution, the “rhetoric of conclusions” that persists in academic fields can find a way into narrative inquiry as well (Conle, 2000).

The temporal nature of narrative inquiry, tentativeness of conclusions, and intersubjectivity make for shaky ground in a world that still closely clings to empiricist ideals. However, this instability is what allows for narrative inquiry to communicate the cultural, interpersonal, and linguistic influences of experience, especially when the multiple possible meanings and tellings of a story are understood (Bruner, 1987/2004). This, in a post-positivist, post-modern worldview, is what gives narrative inquiry its value.

Narrative inquiry is often criticized as being indistinguishable from fiction (Clandinin & Connelly, 2000; Conle, 2000). There is though an aim for a criteria of “right-ness” that the researcher searches for in the stories of participants. It is difficult to ascertain whether a storyteller accurately represents the details of a story, how they felt, the context, and social interactions. Some argue that the inaccuracies, the omissions, are just as important to the narrative researcher as the accuracies (Bruner, 1987/2004; Clandinin & Connelly, 2000; Larson, 1997). In addition to difficulties in determining the rightness of told stories, the researcher can also “fake the data” or use the data to generate a false understanding

(Connelly & Clandinin, 1990). Careful attention and transparency of assumptions and intentions throughout the completed narrative allows the researcher to address the fictional quality of narrative research by providing modes of understanding as well as alternative possible interpretations.

Narrative researchers should avoid the urge to wrap up narratives in packaged stories complete with a “Hollywood plot” where the lives and experiences of the participants are written with a sense that “everything works out well in the end” (Clandinin & Connelly, 2000; Larson 1997). The narrative researcher should remain true to the participants of the study as well as their experiences and understandings as they are presented in the stories told.

That the narrator and the central figure of the narrative are the same can create a complexity for narrative inquiry. The retelling of life experiences can evoke a desire within the narrator to relate the *intentions* of his or her actions rather than an accurate depiction of events. It is rarely a goal to paint one’s self in a poor light, and upon reflection intentions may tend to reveal what a narrator feels is a truer sense of the story than actual events. This reflexivity brings about problems that Bruner (1987/2004) called beyond verification, beyond indeterminacy, and beyond rationalization. That the act of telling the story changes the story itself is part of what puts narrative out of reach of the criteria of verifiability.

Consumers of research often look for ways in which to generalize the data, making it applicable in multiple situations. Applying data to multiple situations becomes troublesome for narrative inquiry as forming generalizations from a story, nested in its context and particulars, is precarious work (Carter, 1993). However, without generalizations the facts of a narrative may be seen as useful only at one particular time (Conle, 2000). It is the open-endedness, the invitation to construct multiple meanings that saves narrative inquiry from the

necessity of generalization. It is not the generalizations made of the narrative but the opportunity to see the multiple ways of making meaning that gives the research value.

Stories that are stripped from their context can become generalizable illustrations to be used in multiple situations (Conle, 2000). For narrative inquiry, it is important that narratives remain context rich, not opened up to the possibility of becoming an anytime, anywhere illustration. Examples of this prevail in educational research with stories of the effective as well as the deficient teacher (Carter, 1993). Without their context, these stories of what to do (or not to do) in the classroom are of little benefit to the reader. Context free, the narrative fails to illustrate what interactions and experiences influence the decision making of the individual, limiting opportunities for meaning making by the reader.

The turns of narrative inquiry require a reinterpretation of the researcher-researched relationship (Casey, 1995; Chase, 2011; Connelly & Clandinin, 1990; Errante, 2000; Larson, 1997; Pinnegar & Daynes, 2007). The relationship becomes one of narrator and listener (Chase, 2011) with an interactive quality that frees subjects (narrators and their stories) from being bound, static, atemporal, and decontextualized (Pinnegar & Daynes, 2007). The constructed relationship with collaboration of mutual storytelling allows for the voices of all participants (narrators and inquirers) to be heard and begins with the story of the narrator (Connelly & Clandinin, 1990).

The intersubjective nature of the relationship focuses first on the integrity of the narrators' stories as subjects, rather than objects, to be studied where the inquirer is careful not to assume understanding (Casey, 1995). It is the goal of the researcher to communicate true narratives, careful to pay attention to assumptions, intentions, and interpretations from a vantage point of "I the critic" (Connelly & Clandinin, 1990). Larson (1997) requested the

relationship emerge as a dialogue where narrators and researchers engage in practices that work to untangle the complex meanings assigned to experiences by story-tellers, rather than relying on the monologue of the narrator to be examined later, without input, by the researcher.

The assumptions of the researcher in narrative inquiry can become problematic if not identified, addressed, and communicated. These assumptions determine what stories are told, what voices are heard, and the interpretations made (Errante, 2000; Larson, 1997). Without taking these assumptions into consideration the story can become distorted. It is the job of the narrative researcher to reflect on and understand their own assumptions and discuss these with participants to construct understanding. It is not the role of the researcher to assume to know the inner life of the narrator. Instead, the role is to contribute to the intersubjective relationship that works together to construct a new narrative.

It is important that the narrative researcher approach his or her study with the limits, criticisms, and dangers of narrative inquiry in mind. However, too heavy of an emphasis on the role of the inquirer as “I the critic” can carry with it a negative connotation of monitoring (Clandinin & Connelly, 2000). An awareness of the researcher’s assumptions, personal beliefs, and alternative interpretations will allow narrative inquiry to carry with it the open-endedness and invitational quality that is its strength.

Method and phenomena. In narrative research the term “narrative” refers both to the method and the phenomena studied (Connelly & Clandinin, 1990; Pinnegar & Daynes, 2007). The methodology of narrative inquiry involves the collection of story complete with a form of analysis that may aim either to identify themes or attributes of familiarity across stories and subjects or to unify elements of individual or collective stories into a whole

(Polkinghorne, 1995). The narratives, the stories collected, are the source of the researcher's data are the phenomenon studied.

A story is a thoughtfully constructed text that communicates a string of events that includes situation, protagonist, and sequence of experience; it includes feelings and mood as well as moral implications (Carter, 1993; Conle 2000). Life stories are individual and collective, told and retold, and are the intersection of social influences and a person's unique history (Clandinin & Rosiek, 2007; Ely et al., 1997) that give voice to human knowledge situated deeply within the often complex contexts of lived experience (Conle, 2000). Stories make events meaningful and are a unique form of communicating meaning through the sculpting and ordering of the retelling of experience (Carter, 1993; Chase, 2011). The telling of a story puts history in the hands of those who lived it; a way to negotiate power and lay down a path towards a self-made future (Casey, 1995).

Collecting, retelling, and writing of narratives is not the same as interpreting from raw data. Stories come complete with evaluations and theories that are revealed through the patterns of inclusion and omission that shape the framework of meaning that the narrator brings (Casey, 1995) as well as interpretations, moral implications, and cultural influences. The stories of interest to the narrative researcher "are the form of representation that describes human experience as it unfolds through times" (Clandinin & Rosiek, 2007, p. 40).

The purpose of narrative inquiry is to identify meaning in personal experience through exploration of the social, cultural, and institutional narratives of those experiences (Chase, 2011; Clandinin & Rosiek, 2007). It is not the desire of the narrative researcher to create a replicate representation of the experiences of individuals. It is to take the description

of experiences and the interpretation of the storytellers and create a new understanding, a new way of living in and relating to the environment (Clandinin & Rosiek, 2007).

Reflection, retelling, and explanations of experiences occur at the same time as the storyteller lives within a continuous “experiential text” which adds to the complexity of the inquiry (Connelly & Clandinin, 1990). While the story is retold, reworked, and reconstructed, new understandings and new experiences arise for the storyteller, which alters the phenomenon, the story. Clandinin and Rosiek (2007) asserted that for the narrative inquirer this is not a problem but rather the purpose of the methodology. The goal of the narrative researcher is to bring about change and allow for the construction of new understandings

Stories are told in a sequential fashion, which carries a danger of creating an illusion of causality. “A sequence of events looked at backward has the appearance of causal necessity and, looked at forward, has the sense of a teleological, intentional pull of the future” (Connelly & Clandinin, 1990, p. 7). The narrative researcher must be sure to include a sense of open-endedness in his or her data; giving a narrative account an “invitational quality that will occasion vicarious experience for the reader” (Conle, 2000, p. 52) and allow for multiple possible interpretations. For example, interpretations of the reader may vary from the author based on his or her experiences. It is not the aim of narrative research to prescribe meaning to experiences, but instead use the stories told and their context to construct an understanding.

The turns from previous forms of research result in alternative suggestions for criteria in narrative inquiry. It is not the case that “any old story” will do when assessing the quality or value of narrative research (Hatch & Wisniewski, 1995). Suggestions for possible criteria include: adequacy, aesthetic finality, accessibility, apparency, authenticity, believability,

closure, credibility, compellingness, continuity, explanatory power, familiarity, fidelity, moral persuasiveness, persuasiveness, resonance, sense of conviction, transferability, trustworthiness, verisimilitude, economy, narrative truth, plausibility, selectivity, as well as an attention to the temporality of experience (Conle, 2000; Hatch & Wisiewski, 1995). While this extensive list provides vocabulary for the evaluation of narrative research, the move from the tradition of formative research practices leaves the method open for construction and reconstruction of the criteria that give each work value and quality.

What is important to consider for narrative inquiry is that the methodology is still evolving (Casey 1995; Chase, 2011; Connelly & Clandinin, 1990). Casey (1995) suggested that the lack of simple equations for the field of narrative research exists while researchers and groups of researchers struggle to create coherent and consistent work. Connelly and Clandinin (1990) put the task on each individual researcher to define the criteria that best suit his or her work. I suggest that it is perhaps not an artifact of the age or novelty of narrative that makes the identification of unified criteria difficult, but instead the nature of the methodology. The worldview that defines narrative inquiry is one of constructed realities. These realities are constructed by the intersection of individual experience within a social sphere and built in a continuous stream of place and time. I predict that, as it is today, the task of determining the appropriate criteria will continue to be the task of the researcher or groups of researchers who seek coherent work based on the realities of the researcher and the goals and intentions of the investigation.

Narrative in education. Narrative inquiry is a useful tool for understanding teachers' beliefs, knowledge, and experiences (Carter, 1993; Conle, 2000; Connelly & Clandinin, 1990; Drake, 2006). Clandinin and Connelly (2000) called teacher knowledge “expressions

of embodied individual and social stories” (p. 3). Including the social, cultural, political, and historical contexts of the origins of teacher knowledge provides a wider base for understanding what teachers know and do (Carter, 1993; Elbaz-Luwisch, 2007). It is not only the context of the teacher’s biography that should be taken into consideration but also the context of the school, school system, curricula, ideologies, pedagogical trends, and reform processes (Elbaz-Luwisch, 2007).

What narrative inquiry gains in the personal it loses in the general. The specific and particular nuances of individual experience and understanding are of great interest to the narrative researcher and can provide unique approaches to meaning making; and, when communicated appropriately can offer new insights for participants, researcher, and reader. In a field such as education, with the demands of reform and “best practices” it is both imperative and difficult for the researcher to remain true to the worldview of narrative research and resist the demands for generalizations and hardened stories stripped of their context. It is the context, the temporality, and the specific that give value to narrative inquiry in the process of constructing understanding.

Life history. Life history research is a form of narrative inquiry that has been used in psychology, gerontology, sociology, anthropology, history, education, literature, religion, and philosophy (Atkinson, 2007). In life history research the goal is to understand the patterns of life stories and how they fit within the history and context (social, environmental, and political) of the storyteller (Adriansen, 2012). The narrative of an individual’s life history includes the life as experienced — “the images, feelings, sentiments, desires, thoughts and meaning known” (Biott, Moos, & Moller, 2001, p. 396). Gathering the life story of an

individual gives the researcher and the reader “the clearest sense of the person’s subjective understanding of his or her lived experience” (Atkinson, 2007, p. 233).

In distinguishing life history from narrative research, Hatch and Wisniewski (1995) solicited the opinions of various qualitative researchers to identify that while narrative is useful to understand and make sense of “particular experiences,” life history aims to make meaning of a person’s life as situated within the historical, social, and cultural environment they live/lived. Life histories, they argued, require the analysis of narratives as well as the social, historical, political, and economic contexts of a life story using a paradigmatic cognition to move beyond a collection of “life stories.” It is the consideration of the life of a participant as a whole that distinguishes life history from its parent category of narrative research. Relying on the triangulated data of historical context of life stories allows the researcher to invoke paradigmatic cognition and construct meaning from the self-told life stories of participants.

Narrative researchers collect and tell stories of lived experiences to study the way humans experience the world (Connelly & Clandinin, 1990; Ely, Vinz, Downing, & Anzul, 1997). Approaching the research of the professional life histories of effective upper elementary science teachers through a narrative, life history approach provides the opportunities for the stories of valuable educators to be shared. The stories carry with them insights into how effective teachers make meaning and construct understanding from their experiences. The telling, collecting, and retelling of stories creates a resonance of metaphorical connections that carry a story along and produce more stories (Conle, 2000) and with them, new knowledge and understanding. I hope to use this resonance to help

construct new knowledge regarding science teachers who are effective both in the classroom and the outdoor learning environment.

Pedagogy of the Schoolyard

The OLE is a place where many concepts taught inside the school can come to life (Dyment, 2005; Wagner, 2000) that is often overlooked by classroom teachers (Cronin-Jones, 2000). Most literature that investigates teaching in the OLE focuses on the evaluation of specific curriculum impacts for students and teachers (Alexander, North, & Hendren, 1995; Blair, 2009; Klemmer et al., 2005; Thorp & Townsend, 2001), challenges teachers encounter (Dyment, 2005), and impacts on student attitudes and beliefs regarding food and the environment (Graham & Zidenberg-Cherr, 2005; Lewis, Mansfield, & Baudains, 2008; Martin, 2003; Moore, 1995; Ozer, 2007; Robinson-O'Brien et al., 2009; Skelly & Bradley, 2007).

Research that focuses on the pedagogy of educators in the natural environment is limited to educational experiences in nature centers and reserves and other off-campus natural learning areas (Ballantyne & Packer, 1996; 2009; Tal & Morag, 2009). The findings of such studies can be applied to the classroom teacher as they integrate the OLE into their teaching practice. Ballantyne and Packer (2009) stated “the most engaging, effective, and enduring learning experiences in the context of learning in natural environments, occur through experienced-based rather than teacher directed strategies” (p. 259). The experienced-based learning pedagogical aspect that they ascribe to teaching in natural environments includes learning by doing, being in the environment, real life learning, sensory engagement, and inclusion of the local context.

Framework for Teacher Development

Preservice teacher education programs work to provide students with experiences that will prepare them as effective classroom teachers (Carrier, 2011; Davis & Smithey, 2009; Gezer & Bilen, 2007; Ginns & Watters, 1999). But, teacher learning does not end (nor begin) with pre-service education experiences (Hammerness et al., 2005). Practicing teachers continue to learn about their role as educators from reflection on their own practice, through engaging with other teachers, in degree programs or professional development, through graduate programs, and finally through experiences that extend beyond their formal professional work (Bransford, Brown, & Cocking, 2000).

Hammerness et al. (2005) developed a framework for teacher learning that draws on previous research of theoretical frameworks for teacher development, professional standards for teaching, and a philosophy that states that teachers “learn to teach in a community that enables them to develop a *vision* for their practice; a set of *understandings* about teaching, learning and children; *dispositions* about how to use this knowledge; *practices* that allow them to act on their intentions and beliefs; and *tools* that support their efforts” (Hammerness et al., 2005, p. 385). Hammerness et al.’s framework for teacher learning first places the teacher in a community of practice that forms them as life-long learners, seeking career-long development. The teacher’s vision identifies for him or her what is possible in teaching and connects values and goals to classroom teaching and is what Hammerness et al. (2005) identified as “the first step toward addressing the apprenticeship of observation and the process of enactment” (p. 386). Rather than set as sequential stages of development, the remaining facets of teacher learning are integrated within the sphere of the teacher’s learning

community to further develop his or her understanding and dispositions regarding the practices and tools of teaching.

With classroom teaching as the central focus of pre-service and in-service teacher development, it is unclear how the experiences of teachers lend them the skills necessary to effectively engage their students in learning in the OLE. It has already been stated that teacher development programs fail to stress the importance of opportunities in nature or the challenges of outdoor teaching (Tal & Morag, 2009). With the assumption that utilization of the OLE is a beneficial tool for elementary science teaching, it is then important to delve into the framework of teacher development and examine the experiences of teachers who effectively use the OLE for teaching.

Chapter 3

Method

Because the experiences that shape a teacher are so varied, it is difficult to form generalized statements regarding teacher development (Bransford, Brown, & Cocking, 2000). The life histories of educators can help researchers understand how teachers came to be in their profession (Atkinson, 2007). Educational decisions and teaching events are framed within the moral and philosophical contexts of a teacher's life history (Biott et al., 2001; Carter, 1993). Attending to the life history of teachers and how they have made meaning from their lived experiences can offer understandings of the decisions they make in their careers as educators.

This can be especially useful when considering the professional life histories of effective teachers. The narrative approach to inquiry allows the investigator to collect stories of experience that are deemed meaningful by participants. Beyond that, the stories themselves carry with them a level of interpretation and meaning making through their telling. The life history researcher can place the stories of a teacher's professional life within the historical and social context as well as the context of the school and school system that impacts experiences and decision-making.

A co-constructed professional life history of the educator has the potential for a broader, clearer understanding for the contexts and experiences that help to lay the groundwork for the effective science teacher. Inquiry becomes open to the meanings and understandings that emerge throughout the investigative and analytical process since it is approached without concrete adherence to predetermined criteria or themes to apply to

narratives of professional life. What this means for the researcher, which is often true in research, is the end of the project may not provide the answers expected.

Context

The five participants included in the study met the inclusion criteria of being: (a) teachers of elementary science in grades three, four, or five, (b) employed in a North Texas school within the REAL School Gardens (RSG) network of partner schools, (c) described as an effective teacher in the outdoor learning environment (OLE), and (d) described as an effective teacher within his or her classroom. I excluded participants using the criteria of: (a) speaking a language other than English and (b) having fewer than three years teaching experience.

RSG works with low-income schools to design and install learning gardens. During and after garden installation RSG works with teachers to train them to effectively use the outdoor space for learning (for more information see Appendix A). The network created by RSG acted as merely a recruitment tool and the program initiatives, design, training, or mentoring is not a focus of this study.

Recruitment

The recruitment process began with solicitation via email (see Appendix B) of the education staff of RSG for recommendations of upper elementary science teachers or campuses which have demonstrated effective teaching using the OLE. The resulting list contained 25 campuses and aided me as I determined potential school sites. Of the 95 schools in the RSG network, I contacted only the 25 campuses of individuals recommended by RSG staff. I contacted principals of selected campuses through email (see Appendix B) to request a phone meeting. In most instances, multiple email attempts were made. During successful

phone meetings I requested that administrators identify effective science teachers on their campus in grades three through five. The purpose of utilizing a phone call for this step in the recruitment process was to both share the established criteria of effective for this study and ask administrators to expand on their recommendations to illustrate how they determined the effectiveness of educators. I then created a master list of teachers who were recommended both by administrators and RSG educators. In a few cases, educators were recommended by administrators with such high praise of their outdoor teaching and were added to the list without recommendation by RSG staff.

The resulting master list included only eight teachers. I contacted those eight teachers via email (see Appendix B) to request their participation. Seven teachers responded affirmatively and remained on the list for selection. To ensure a diverse participant pool, I contacted the participants for scheduling based on location, teaching assignment, and gender. The final participant list included five teachers: three women and two men, one third-grade teacher, one fourth-grade teacher, one science strategist, one science lab teacher, and one environmental science teacher.

Participants

Each participant, school, and district was assigned a pseudonym to protect the confidentiality of the teachers. The following is a brief introduction to the participants.

Kevin is a male third-grade teacher in his fifties. He teaches mathematics and science at West Elementary School in West Urban Independent School District (WUISD). He came to the profession through an alternative certification program and has been teaching for over 20 years the same grade in the same school.

Angela is a female science lab teacher in her fifties. She teaches at Grand Elementary School in West Suburban Independent School District (WSISD). She came to the profession through a traditional teacher preparation program for special education (SPED) at a public, suburban university and has been teaching in the same district for over 20 years.

Steven is a male environmental science teacher in his thirties. He teaches environmental science at Green Elementary School, an environmental science school in East Suburban Independent School District (ESISD). He came to the profession through a traditional teacher preparation program for elementary education at a liberal arts university and has been teaching in the same district for 15 years.

Dianne is a female fourth-grade teacher in her fifties. She teaches at Applied Elementary School in WUISD. She came to the profession through a traditional teacher preparation program for elementary education with a reading minor at a public, urban university and has been teaching in the same district for over 30 years.

Kathleen is a female science and mathematics strategist at Oak Elementary School in East Urban Independent School District (EUISD). She is in her forties and came to the profession through a traditional teacher preparation program for elementary education at a public, urban university and has been teaching for over 20 years.

Data Collection

Interviews provided the data for the investigation of the professional life histories of the effective elementary science teachers. I conducted three one-hour interviews with each participant. All interviews were audio taped using two digital audio recorders and then transcribed. Participants selected the time and the location of the interviews because it was important to conduct the interviews in an environment where the participants felt safe to

share their narratives of experience. Kevin and Diane chose to use their campus and classroom for the location of all three of their interviews. Angela and I first met at a public park where she volunteers, then subsequent interviews were conducted on her campus in her classroom. Kathleen chose to meet at a public restaurant so that weekend meetings could be arranged. Steven chose his classroom for the first two interviews and the third was conducted at a public coffee shop on a weekend.

The first interview with each teacher followed a semi-structured format where I presented them first with the prompt, “Tell me a story about the time when you first decided to become a teacher.” Follow-up and probing questions were used throughout the interview as participants narrated their stories of experience to ensure that the topics of: (a) inspiration to teach, (b) pre-service education and training, (c) in-service education and training, and (d) mentoring and support were addressed.

The second interview built on responses provided by each individual participant. The questions and topics for the second, semi-structured interview were constructed based on dialogue with each participant during the first interview (see Appendix C). The third interview built on each of the first two interviews, using collective participant responses to frame questions that were presented to guide the dialogue with each participant. Like the first interview, the third interview followed a similar protocol with each participant (see Appendix C). The third interview also acted as a means of member checking with the participants to ensure that what I had heard and interpreted from the previous interviews was in fact what the participant intended.

Analysis

The analytical focus of narrative inquiry is implied in the turn from objective facts to an understanding of meaning made from the voices within the collected narratives (Chase, 2011; Pinnegar & Daynes, 2007). This focus is what Carter (1993) called “of central importance” to addressing the shifts in interpretation, meaning, and power of the field of narrative inquiry. This analytical style requires that the subjectivity of the researcher be revealed and discussed throughout the study to remain true to the “I the critic” role suggested for narrative inquirers.

Polkinghorne (1995) relied on Bruner’s distinctions of *paradigmatic cognition* and *narrative cognition* to identify the goals of analysis in narrative inquiry, calling them differences between “analysis of narrative” and “narrative analysis.” The analysis of narratives relies on paradigmatic reasoning, where the goal is a description of themes that is evident throughout stories. Narrative analysis, which relies on narrative reasoning, instead aims to collect descriptions of events and unify them into one story. Succinctly he wrote, “Analysis of narratives moves from stories to common elements, and narrative analysis moves from elements to stories” (p. 12).

Analysis in narrative inquiry is often conducted alongside the collection of data, rather than after all data is recorded. Using transcriptions of participant interviews, I employed a method of analysis that responds both to the paradigm of narrative inquiry as well as the discourse that the data establishes. It was difficult to ascertain prior to collection whether the narratives of the participants would move from separate stories into common elements or rather join individual experiences into a common story. Once I constructed the

participants' professional life histories, it became clear that paradigmatic reasoning would be used in the analysis of the narratives.

As many qualitative researchers do, I have taken the role of “bricoleur” in this research, piecing together tools and techniques of interpretation and representation as they are added to the puzzle (Denzin & Lincoln, 2011, p. 4). Beginning with the narrators' stories of experience, I start with the voices *within* each narrative (Chase, 2011) to construct their professional life histories. As Atkinson (2007) suggested, the professional life stories collected here have both an individual and social purpose. Individually, the narratives of the participants' professional life histories tell their story. Collectively, I look at the voices *across* each narrative (Chase, 2011) and begin to uncover themes that emerge from their narratives of professional life histories together with themes from the literature regarding the development of teachers.

The goal of this research was to investigate and share the experience of the participants and to relate those experiences to theory that exists in the literature on teacher development. Constant Comparative Analysis combines explicit coding with theory development by using an analytic procedure that relies on constant comparisons (Glaser, 1965). Using primarily predetermined themes of teacher development from Hammerness et al., (2005) then secondarily themes that emerge from the professional life histories of the participants I utilized a constant comparative method to construct the voices across the collected narratives.

I used transcriptions of the interviews first to construct a chronological telling of the professional life histories of each participant as individuals. Their narratives were unitized or broken into over 1,200 meaningful data pieces that varied in length (see Table 1) to analyze

the voices within each narrative as well as the themes across the narratives (Chase, 2011). To construct the professional life histories, I sorted and coded the data units (which were printed onto note-cards) by chronology and subject for each participant. For example, I grouped all data units referring to student teaching experience together as well as all data units referring to experiences with high stakes testing. Once I arranged the data units accordingly, chronological narratives of the participants' professional life histories could be constructed.

Table 1

Examples of Unitized Data

Participant	Data Unit
Steven	And reflection. That was our thing. We had to reflect on everything.
Kathleen	Here's the thing. If you teach kids how to think. Then it doesn't matter what test you put in front of them. If you teach kids how to (pause) if you teach kids creative problem solving if you teach kids how to ask their own questions, then teaching is about teaching kids the value in what they're learning, how it applies to real situations, why is it important.
Kevin	When I went to college I didn't know what I wanted to be
Angela	So I taught science, social studies, and math, and my tool was science. And that was my core.
Diane	In (city) all of my trainings besides that reading training was down on the east side. So our students were very high needs.

After I constructed the professional life histories, I analyzed, sorted, and coded the same data pieces using a constant comparative method (Glaser, 1965) based primarily on themes from the existing framework of teacher learning (Hammerness et al., 2005) and secondarily on emergent themes using an Excel worksheet (see Table 2). The Excel worksheet allowed for data units to be duplicated if they fit more than one code.

Table 2

Examples of Data with Primary and Secondary Codes

Interview	Card	Data Unit	Primary	Secondary
S2	31	I wrote math curriculum and then I did math workshops on and off for the math department for years on summers and after school and stuff like that I don't mind doing that that's just not I don't want to do that all the time.	Practice	Curriculum writing
A1	40	I was trying to individualize everybody because that was the way I was trained. And. . . It was a struggle. Then I just. . .	Practice	Differentiation
KK1	52	But I just try to think you know not to be corny but I know there was this thing that was really pushed back in CA we were taught Gardner's different multiple intelligences and how to kids learn best and clearly if you really think about your kids and how each one of them is gonna grasp a new concept, some kids learn best through musically so they might write a rap about weathering and erosion some kids are going to learn best through movement so we're gonna play a food chain game we're gonna get outside and run around some are gonna learn best interpersonally intrapersonally through writing through research through reading about it so I tried to . . .	Tools	Learning theory
K1	108	And I think that's one thing I've learned too is that (pause) and I don't know if everybody did this but, especially with 3rd graders, everybody that taught me, they probably didn't feel they had to because I was older, is that you have to point out those things to 3rd graders, why I'm here, and why you make me happy, and why you need to pay attention, or why you need to show your work and you need to do it over and over and over	Understanding	of children

D1	167	I mean I knew early on I needed a lot more science then I ever had cause I didn't have any really, I had the science that I used for a business major and it wasn't really it wasn't great.	Understanding	of content
A1	82	I have a product and the product is earth, or their community, their town, cause they're gonna be citizens and they are citizens but they are going to be responsible adults some day and I just feel like I've got to instill that they need to be aware of the earth, we have to take care of it, we have to be stewards, and its gotta be maintained.	Vision	Children as conservationists
D3	56	So. I think because I'm just I'm challenged by it and when you really reach a difficult kid its like, wow maybe you've changed their lives.	Vision	Impact

Chapter 4

Findings-The Voices Within Five Teachers

This chapter presents the participants' professional life histories. Each participant's story is told, using his/her words and revealing the voice within the narrative. The narratives were constructed using the participant's responses and stories collected during interviews. After construction, each participant had the opportunity to review his/her professional life history looking for misrepresentation, misunderstanding, or omitted data. This provided me the opportunity for member checking, ensuring I had stayed true to the voices of the participants, telling their narrative as they would.

Kevin: Learning science in nature is fun

To date, Kevin has taught for 22 years, all at West Elementary. He entered teaching after a career as a landscape architect. His bilingual certification came from Kevin's participation in an alternative certification program through his local Educational Service Center. Kevin began teaching in a self-contained, third-grade bilingual classroom. In his sixth year at West Elementary he transitioned to teaching third-grade mathematics and science only. West Elementary had their RSG garden installed in the spring of 2004. Since that time, West has been partnered with RSG to receive support in the form of supplies, funding, and professional development opportunities. Kevin has been the garden coordinator at West Elementary since 2004.

Kevin grew up in a small town in Texas in the 1960's. He was surrounded by farmland, natural areas, and a creek where he did most of his playing. He grew up speaking Spanish and English thanks to his bilingual parents. Kevin's schooling includes two teachers who had a strong impact on him. Mr. Smith taught junior high social studies and high school

history in a way that connected to the students and built relationships that have lasted through Kevin's adulthood. He enjoyed his history classes so much he considered teaching history before entering college. In high school drafting, Mr. Matthews found a way to connect his content to students' real-world experiences. He provided a forum for debate, cross-disciplinary study, and field trips that sparked his students' interest in drafting. Extended class periods and an engaging environment connected Kevin to drafting and he considered it as one of his future career choices.

Kevin began his college career at a community college and then transferred to a large suburban state college. He entered university with the idea of being a draftsman, but was not truly set on what career path he would take. While searching through the course catalog architecture caught his interests. He enjoyed drafting and mathematics in high school, had seen the movie *The Fountainhead*, and was interested in the students who walked around campus carrying rolls of architecture rendering. So with only a vague idea of what it entailed, he declared architecture as his major. Before too long, the head of the landscaping department recruited students from architecture. His herringbone jacket and the department's more relaxed attitude attracted Kevin and he switched over to landscape architecture.

His architecture and landscape architecture classes, much like his drafting course in high school, relied on hands-on and real-world experiences for learning. An "English for architects" class piqued Kevin's interest in reading American novels and engaging in class discussions. "Physics for architects" saved Kevin and his colleagues from the complex content of physics for engineers while still teaching them the content they needed. A memorable physics professor, with his pants pulled over his belly button, engaged his students in hands-on physics related to their careers as architects.

After graduating Kevin worked as a landscape architect. He worked for an apartment complex and for a nursery designing and constructing landscapes, and eventually was self-employed. Several years after working as a landscape architect, Kevin started looking for something new. Volunteering at his daughter's elementary school rekindled his desire to become a teacher. With the support of his family, Kevin was able to enroll in an alternative certification program pursuing his bilingual teacher certification.

Kevin's alternative certification program included individuals from multiple backgrounds, most of whom were seeking a second career. His courses focused mostly on theory of teaching and were conducted in large rooms filled with students. Few of his lessons were hands-on and most felt like the role of the student was to sit and listen while an expert stood and talked. Kevin's bilingual training consisted of 12 college credit hours with other alternative certification students in smaller class settings. In those courses Kevin learned about the history and theory of bilingual education and met with second language students to learn about their culture and their experience learning a new language. His alternative certification program provided few opportunities for observation and engaging in classroom settings. Kevin gathered some experience in the classroom as a substitute teacher, but that exposure was limited and he remembers feeling unprepared as he began his role as a third-grade teacher.

Kevin was hired as a bilingual teacher at West Elementary where he has worked for 22 years. He describes himself as terrible as a beginning teacher. Recently, Kevin ran into a former student from one of his first years as a teacher. He said to her, "You didn't learn anything from me, did you?" She said she remembers drawing a little squiggly line. Laughing, he responded "That's all you remember?!"

He was unprepared starting with the first week of school. Kevin remembers leaving school the first day fearing he had made a mistake. Encouragement from Kevin's principal and his mentor teacher inspired him to stick it out.

Kevin's mentor teacher, Mrs. King, was passionate, hard working, organized, and hard as nails. Teachers would ask her, "How do you get the students to salute you like that?" Mrs. King had a relationship with her students that allowed her to be jovial and still run a tight ship. She helped Kevin with the classroom management piece that his alternative certification coursework lacked. Mrs. King relied on the science textbook and vocabulary study for her science curriculum. To enrich her classroom for her gifted and talented students, Mrs. King would bring in shells she collected from the coast, pinecones and other objects found outside, and even set up a saltwater fish tank.

As most good pupils do, Kevin began his teaching career modeling himself after his mentor teacher, learning from her expertise. As a self-contained teacher without much curriculum support, Kevin relied on the science book and teacher's guide for his science content and ideas for teaching. Vocabulary study and occasionally a video were the bulk of his classroom's experiences until he, too, began to bring in objects from the outside world to engage his students. Science textbook investigations offered predictability for Kevin and gave him comfort in knowing exactly what was going to happen in the classroom. After nine or 10 years as a self-contained third-grade teacher, Kevin transitioned into teaching third-grade mathematics and science.

Initial trepidation over losing a self-contained classroom shifted to ease and a feeling of success as a teacher of only mathematics and science. As Kevin attended professional development he became more comfortable with his ability to give students various ways to

experience learning. Kevin collected objects from nature to bring into the classroom and grew various plants in pots and containers in the school parking lot as a way to give his students various experiences. He knew it would be more exciting for students to see the real thing instead of looking at a drawing or an illustration in a book.

Ten years ago, When Kevin's principal asked if he would like a chance to get a garden for the school he jumped on it. After RSG installed the garden in 2004, Kevin had the resource of the garden and did not have to collect natural objects to bring into the classroom to show his students; he could simply take his students outside. He is confident outside experiences leave an impact with his students. The fifth-grade students who were interviewed for the RSG website best illustrated the value of experiences in the garden. One student said to Kevin, "I used to think I was an indoor person because I always watched TV and played video games, but once I got in the garden I realized I'm an outdoor person." Another said, "I just learn better. It's better than looking, when you look at a book you don't really learn anything but when you're out here and you see it, it's better." These are reasons why Kevin says using the outside to teach is better.

It took a while for Kevin to adapt to using the OLE as an extension of his classroom teaching. He recalled a quote that he attributes to Aldo Leopold; "There's as much science in a dandelion growing in the crack of the sidewalk as there is in the redwoods in the Sequoia National Park." The dandelions, or a tree growing in the crack of his school's sidewalk, allow him to take his students out the school doors to the playground to find science. Whatever he is teaching—mathematics or science—has something to do with the garden and it makes his teaching more fun for him and his students.

Kevin has sought professional development that appeals to his desire to be outside and further his connection with nature. The professional development provided by RSG and Botanical Research Institute of Texas (BRIT) have supported Kevin in connecting his science and mathematics content to what is happening in his garden and the OLE. In addition it has given him opportunities to reflect on his content and pedagogy. BRIT intends to introduce teachers to practices that are research-based, hand-on, and are influenced by a place-based philosophy (Botanical Research Institute of Texas, n.d.). These professional development workshops always take place in an environment that is appealing and allow Kevin and other teachers to go outside and “get their hands dirty.” Plus they usually serve food, which Kevin feels is always a bonus. Kevin has also sought out content focused training through a Texas Master Naturalist course. Kevin’s Master Naturalist training deepened his understanding of his surroundings and prompted him to think about how he could apply his new knowledge to third-grade students. Three trips to the Teton Science School in Jackson Hole, Wyoming organized by BRIT and RSG collectively gave Kevin additional experiences in content and pedagogy related to the outdoors. An educator from the Teton Science School set Kevin and his colleagues at ease by encouraging questions as they explored their surroundings and learned about a new place. His friendliness and openness caused Kevin to think about his students and the questions they may ask in the classroom and OLE.

Kevin is not the only teacher at West Elementary who uses the OLE. However, he recognizes that not all teachers are comfortable using the garden or may not be interested in it, and forcing these teachers to use the OLE to teach is not beneficial for them or their students. Kevin feels it is important for students to have a different teacher each year so that

students get experiences with teachers who have a variety of passions from reading to mathematics, art to history, and gardening to birding.

Because of RSG professional development and administrative support, the garden has become woven into the fabric of West Elementary. The school's long history with a garden, regular in-service days that focus on teaching in the OLE, encouragement and support from school administration, and lessons embedded in the district's curriculum framework serve to keep the garden as an integral part of the school's culture and science teaching. The garden provides students at Kevin's school opportunities to have a little bit more knowledge about their surroundings.

Starting with his first few weeks as a teacher, everything Kevin has learned has been cumulative. His English as a Second Language (ESL) professional development entertained and engaged him, gave him skills to teach vocabulary, and provided him with strategies that applied to all subjects that he teaches. His training in bilingual education has helped him consider his students' needs as they acquire new scientific vocabulary. He spends his time at district professional developments looking for the "magic bullet" that he can use to connect the content of mathematics and science to one another and to his students' real world experiences.

District professional development conducted by the Institute for Learning (IFL) left an impact on Kevin. IFL was founded under the notion that the United States' changing economy demands a shift in student expectations from aptitude to effort (Resnick, 1995). To address this shift IFL provides support for educators in the areas of knowledge, community, and tools (IFL, 2014). These trainings presented Kevin and his colleagues with a novel way to think about teaching, a method for encouraging accountable talk among students, and a

way to model criteria charts with students. It also provided Kevin with means for sharing failures and successes with colleagues. Accountable talk was a valuable tool for Kevin, even though it seemed to be an old strategy with a new name. He found value in the criteria charts that IFL encouraged. The learning walks that IFL implemented for teachers within WUISD seemed to Kevin like more time away from actual teaching and not beneficial.

Other district initiatives and professional development have left less of an impression with Kevin. WUISD implemented a district-wide curriculum framework five years prior to this study. The curriculum framework provides teachers with a map of Texas Essential Knowledge and Skills (TEKS), the number of class days to spend on each content topic, and suggestions of best practices for teaching. To accompany the curriculum framework, the district administers curriculum-based assessments (CBAs) at the end of each six-week grading period. Kevin sees the CBAs as restrictions that do not allow him to take advantage of times of the year for planting, growing, or demonstrating natural cycles in nature with his students. He has to hurry to teach measurement in a two-week period early in the school year so that his students are prepared for the first science CBA. He feels the students are not quite mature enough for the content at that time and he would rather integrate measurement with mathematics teaching. Other initiatives such as tiered interventions intended to address students' special needs have provided vast increases in paperwork and confusion for Kevin and his fellow teachers with minimal training to clarify what is expected of them.

Kevin enjoys being at West Elementary. He has been successful because he has had plenty of support, encouragement, and feels liked by the administrators and other teachers. Thinking back on his principals, who all happen to have been female, he reflects on the encouragement they offered. The support from his principals, which comes in the form of a

pat on the back or a “job well done,” lets Kevin know that he is doing his job competently. Administrator support for Kevin also comes in the form of autonomy. He knows that as long as he is making decisions with his students’ best interests in mind, he will be allowed to teach creatively and to the best of his ability.

Kevin is still trying to “perfect” his teaching. He does not teach the same year after year because different students, different maturity levels, new ideas, and new professional development encourage him to adapt his teaching. But throughout the years there are some aspects of Kevin’s teaching that remain steadfast. Kevin is passionate about what he does, much like Mr. Smith and Mr. Matthews from his junior high and high school experiences. If he stays at school late it is because he wants to do a great job and he likes doing it. Although he admits he is not as laid-back as he used to be, Kevin also learned how to be laid-back from his former teachers. Finally Kevin’s playfulness is a key tenet of his teaching. He likes to goof around and have fun and his third-grade students are a captive audience. One of Kevin’s student teachers wrote him a thank-you note letting him know that one thing she will remember is how he makes every moment a learning moment whether it is in the classroom, the OLE, or walking down the hall to lunch.

Kevin would rather be outside than inside. His classroom has windows that face the South and allow him to use natural rather than fluorescent light most of the day. The physical features of his classroom and OLE are important to him and he is not sure he would have stayed in teaching as long as he has without them. Kevin comes to West Elementary every day for his students and it is important to him that they know that. On a wall in his room there is a blue sheet where he writes notes to his students about why he came to school. “I came to school to see Clarissa teach us something. I came to school to see Jaden follow the

rules.” He does not come to school for the paycheck or just to teach. He comes to school to feel good about moments that happen with his students

Angela: I can meet my students’ needs...in the garden

Angela has taught for 22 years. She began teaching after graduating from a university program for SPED. She taught SPED for several years at both the elementary and junior-high levels. Because of staff reductions in the program, she was forced to move to regular education. Angela taught multiple subjects in third and fourth grade. In 2008 Angela moved to Smith Elementary and taught fifth grade science. After two years as a successful fifth grade science teacher, her principal created a science-lab position for Angela to teach all the students at Smith once a week. Smith Elementary had a garden installed in the spring of 2006, before Angela arrived. Since that time, the school has partnered with RSG to receive support in the form of funding, materials, and professional development opportunities. Angela took over as garden coordinator at Smith Elementary in 2012.

Angela was raised in a military family, moving almost every year of her life. She has always been an outdoor person. Angela stepped out into the natural areas that were her backyard to follow creeks, investigate woods, and climb trees as she explored by herself. She was a natural scientist conducting her own experiments. When her family moved to West Texas she found herself in a suburban area where she had to search a little harder to find the nature around her.

As a senior at a Catholic high school, Angela was required to do community service. She signed up for the SPED program at the adjacent elementary school since it was right across the street and she did not have a car. The students at the school did not have the opportunities to go outdoors and learn. They had a closed life where their only experiences

were home and school. When Angela sat with the students to play or read it felt as if all of the sudden the students' eyes would light up. She then realized she wanted to be a teacher. Angela selected a public university to pursue a degree in SPED. Without any such disabilities in her family, Angela's parents were confused with her choices and asked her, "Why don't you go into nursing?" But Angela's experience caused her to fall in love with students who have difficulties learning and the rest, as she says, is history.

In college Angela studied SPED with a minor in regular education. Angela describes her coursework as centered on educational theory and textbook oriented with a lecturing professor. Angela's college classes did not require much time in a school setting so she relied on her high school experiences as a volunteer to shape her thinking and learning about teaching. One class required her to write a curriculum for an ideal school. Her professor, Dr. West, asked her to imagine that she had been given a wish list and was a coordinator or principal of a school for SPED students. In this semester-long project Angela created a program that was child-centered and included what she believed to be the best curriculum and objectives to teach mathematics and science. She created this curriculum without even a dream about the technology that would become available to her. At a time where videotapes were the latest technology and computers were still a tool of the future. Angela had to work creatively with the minimal resources that were available to her. This project is the one item that Angela has kept from her college experience. She graduated in 1981.

As a major in SPED, Angela's student teaching experiences were unique. Her first semester occurred at a state school for students with specific learning disabilities. She lived on campus in the infirmary and was immersed in the students and teachers lives. She was placed in a third-grade classroom with a supervising teacher who also lived on campus. Her

supervising teacher showed her how to communicate effectively with the students and to teach all subjects to her third grade class. During Angela's second week, her supervising teacher had jury duty, leaving Angela on her own with no choice but to teach. She was left with a classroom that was very well disciplined and organized. She was given a plan that was workable and students that knew exactly what they were supposed to do in a very well structured classroom. Angela's second semester of student teaching was in a public school in North Texas. The lack of structure in the public school setting was in direct opposition to Angela's first experience with a teacher she considered a role model.

After graduating, Angela moved and began to work for WSISD. She started working in the SPED program at a junior high where she taught all subjects and all levels. The strategy of teaching multiple levels was something that was not addressed in her university training. She approached it as an opportunity to self-teach and she either was going to sink or float. Angela had no curriculum to rely on and had to individualize each lesson for each grade level. The task of creating the curriculum was less daunting, and even enjoyable, because of her experience in Dr. West's class. She remembers the first years of teaching being so difficult because she thought to herself, "I went to college and I'm supposed to know it all." The only person Angela had any contact with as a SPED teacher at the junior high was her administrator, who would come in several times a month to check on her. She did not know that she had permission to reach out to other teachers and to collaborate with her peers. She mistakenly felt she was supposed to be a professional who was competent and knew all the answers on her own.

As a SPED teacher Angela used hands-on teaching with her students. She acted out concepts to assist her students in understanding. She literally got on her hands and knees to

explain some of the concepts. She changed her language and her vocabulary to meet her students' needs. Angela got to know her students' families, their backgrounds, and what they were experiencing at home in order to make connections to their limited senses and experiences. She eventually began collaborating with peers in SPED and began to feel like an effective teacher in her field.

Angela had the privilege of moving to several campuses because of her degree in SPED. Eventually, the program was downsized because charter schools were opened that catered to her SPED students. She was given a choice that was actually no choice at all – leave education or move to mainstream education. Angela mainstream education.

Angela was ready to make the transition to regular education and was excited about the new adventure but a different curriculum made her anxious. She moved into a classroom at Brown Elementary with 27 third-grade students. Angela struggled to meet the needs of 27 students like she had been able to in her classroom of three SPED students. She knew the best strategies to teach SPED students but she did not know the best strategy to teach regular students. She was killing herself trying to meet their individual needs. There were changes occurring in education all over the country and she wondered how she could get help. She began thinking that she was not an effective teacher. She began sharing her experiences with teachers and learning that mainstream education was different due in part to class size. She had a hard time dealing with the differences and not being able to reach her students as individuals, as she had been able to in her smaller SPED classes.

Administrators in Angela's career have impacted her in a variety of ways. One principal at Brown Elementary was supportive of her as a teacher, which made a huge difference regarding working relationships with parents. That principal acted as a cheerleader

and always had an open door, which made Angela feel comfortable, and established a positive relationship. Another principal at Brown Elementary, responding to the pressures of high stakes testing, was “all about the test scores.” During a time when Angela taught third grade she had an experience with an administrator that was negative. That principal rode the backs of every teacher in the school and created an environment that was based on survival of the fittest. Angela, who always looks for the positive side and assumes she can work with anyone, relied on her family for support as she made the decision to stay in teaching for the long haul. She sought advice and recommendations from colleagues for resources and professional development to help her become a better facilitator and teacher. That experience, although demanding and stressful, made Angela stronger.

Angela had experience teaching all subjects in third grade at Brown Elementary but always felt as if it were a battle with the reading and writing curriculum. One of Angela’s principals noticed that she had a special passion for science and moved her to fourth grade where she taught science and Texas history. Brown Elementary was built under an open concept floor plan and her room was the only one with accordion doors. When Angela closed the doors it was time for history. When she opened the doors, the class transitioned into science. She had what she calls an “all-in-one schoolhouse.”

When Angela’s own children were young, she noticed there was no outdoor space for them to play. She always took her children out and got them involved in outdoor activities and wanted them to be aware of the environment and be stewards of the earth. So 17 years ago Angela and her husband worked in their community and with their city council to create a park. In regards to environmental issues Angela has always taken a leadership role

in her community. That leadership helped inspire Angela and give her confidence to follow her passion not only in her community but also as a teacher.

The same principal who noticed Angela's passion for science also noticed Angela's interest in the environment. He shared with her with a letter he received from RSG about a grant and support opportunity for a garden on their campus. Angela's first thought was that it was too good to be true. She had written a grant before to take students on field trips to a local natural area. But that grant was not funded, which Angela feels reflected her inexperience in grant writing. She followed the directions and submitted the RSG application and got it! She relates it to winning the lottery. Receiving the support of RSG empowered her. The installation of the garden at Brown Elementary in 2005 and help from RSG gave Angela a license to shoot for the moon – a license to be creative and open-minded. Angela became a sponge as she sought out any professional development opportunity she could find to learn how to get her students involved in the OLE.

As a beginning science teacher, Angela relied on the textbook and outdated videos. She assumed her students knew what words like *observe* meant and did not use formal or informal assessments. The textbook content went over her students' heads but she just hoped they got some of it and moved on. Later, Angela used her passion for the outdoors to engage her students, who she views as “naturals with science,” interested and connected. Science has always been at Angela's core. She decided to find opportunities where she could teach her passion and become a more effective science teacher.

The science department of WSISD offered curriculum-related science workshops. Angela found these workshops excellent because the administrators sought trainings from across the state of Texas. She went to every workshop she could find because she felt like she

knew so little and that there was so much more to know about science which it is always changing. Over the years the district made attendance at professional development a requirement. She remembers wondering why they would need to be required, thinking science teachers should jump at the opportunity. That is when Angela realized that some teachers are not comfortable with teaching science.

At a district science training Angela was impressed by the research conducted by the presenters and was excited by the grade-level specific training they provided. Angela has been impressed by the quality of science training provided by her district. Her district-level science administrators have always been useful tools for Angela. She relies on her administrators because they have been to more training. They know the testing procedures, they know the strategies, and she can rely on them to lead her in the right direction.

An important “aha” moment came for Angela eight or nine years ago when she was preparing to take her fourth-grade students from Brown Elementary on a field trip to a local park. She remembers thinking that everyone loves science and everyone is going to love the field trip. When she announced the trip she was surprised when her students’ questions focused on whether or not there was a playground. They were not thinking about nature!

Working with people she knew who were experts in the field, she planned stations that the students could rotate through at the park. At one of the stations Angela and a volunteer headed into a wooded oak forest with about 10 students. Angela was at the tail end of the line and an expert birder was at the front. One student refused to walk into the forest and was obviously emotionally distraught. Angela was not prepared for that. The student was afraid and she soon learned his fear was related to a bad experience in the woods. To avoid pushing the student, she talked with him and held his hand to help him through the rest of the

field trip. This was a moment of awakening for Angela as she realized that she needed more training. She realized that she could not take for granted that all students are naturals at learning outdoors and that all students explore the outdoors. She began to think about the kind of environment that her students are coming from and what kinds of settings they live in. That experience forced Angela to evaluate her goals for teaching science; realizing that she has to have separate goals and objectives for teaching students outdoors rather than indoors. Recognizing that there were no experts to talk to, Angela had to seek out her own training and community resources.

Angela contacted individuals who are experts in their fields of birding or native plants and invited them to her classroom, but that was not enough. Those experts worked mainly with adults and did not have the experience of teaching children in the outdoors. Angela then discovered BRIT through a conservation group in which she was involved. During her first visit to BRIT she learned about their educational program and remembers thinking, “I want to work here because they know it all!” She was hooked. Because she was trying to get as much training and hands-on experience as she could, she felt fortunate to discover the “cutting edge” training BRIT had to offer.

At the time BRIT’s educational department was partnered with RSG and provided workshops for teachers. A particular member of the RSG staff was passionate about the program and spiritual about the work. The passion shared by RSG staff helped Angela look forward to the trainings. She most enjoyed going to schools where teachers were training other teachers. These workshops had the most impact on her because she knew the teacher presenting had already gone through the experience and knew what worked. The variety of

lessons and experiences at those workshops where Angela learned from her peers made her a follower of BRIT and RSG.

Professional developments where Angela went out and completed the training with her own hands made her feel more comfortable. They gave her practice in using the outdoors as a routine environment for her teaching. She has noticed that teachers who are intimidated by going outside to teach have not had the experiences she has had learning to incorporate her subject areas through the workshops provided by RSG. Isolated professional development experiences like Project Learning Tree and Project Wild were different for Angela than the ongoing teacher development that BRIT and RSG provide. Project Learning Tree is an environmental education curriculum program designed for educators that work with kindergarten through 12th grade students (Project Learning Tree, 2010). Project WILD is a conservation and environmental education program that seeks to teach awareness and responsible action towards wildlife and the environment (Council for Environmental Education, n.d.). Both Project Learning Tree and Project WILD provide curriculum training for educators. The “teacher friendly” environment of the BRIT and RSG trainings allowed Angela to connect with, and learn from her colleagues, had a lasting impact on her, and are a big resource for her. In her view, RSG and BRIT gave her permission to try her lessons by providing the evidence of research that justifies the benefits of an outdoor education for students.

In 2008 Angela transferred to Smith Elementary, her current school, and started teaching fifth-grade science. Fifth grade was the hardest grade she ever taught because of the structure and testing. She felt like quitting many times because of the stress she was under. The teachers in the fifth-grade team had to make a decision regarding how they were going to

get the students to be successful, how they could get them to pass the state mandated high-stakes test. They decided to follow their passions and Angela volunteered to take science. That is what got her through. When she follows her passion Angela has no boundaries except her curriculum and the scope and sequence. But Angela can be creative. She can think outside the box because she knows her students. As long as Angela stayed with the curriculum, her approach was okay with her administrators. Eventually the stress eased and she fell back in love with teaching. It was easy for Angela to get the science spot in teaching because many teachers are hesitant to take students outdoors. Angela has never had a problem getting students outdoors thanks to her experiences.

After two years of teaching fifth-grade science, Smith Elementary went through some transitions. Angela's principal had a goal to raise the school science test scores and created a science lab position. She wanted Angela to fill it because of her success as a fifth-grade classroom teacher. When presented with the opportunity, Angela did not know if she should jump out the window or embrace her principal. Again, Angela was presented with a choice that was really no choice at all. She knew she could do the job no matter what it took because of her passion for science. It was not easy and it was scary because she was now required to teach first through sixth grade on her own. Angela had a different grade level coming in every 45 minutes to her science lab. She had behavior problems because students would come to her class thinking, "Yay science! We're going outdoors! It's recess time!" Angela became frustrated going through all the pains of trying to figure out how to be an effective teacher for every student in the school. Students came to her either loving science, not really caring, or hating science because of the negative outside experiences they brought to the classroom. Angela realized it was not that they hated HER but that it was the

background they had in any negative educational experiences they brought with them. Either way she felt she was not being effective because she could not reach everybody and it was not the way it is supposed to be. Angela was trained in SPED, where every student's individual needs were important and attended to. That seemed impossible with as many students as she now was expected to teach.

In 2011 her principal retired and the science lab schedule changed. Instead of a new grade level every 45 minutes, each grade level came on a separate day, which eased some of the curriculum stress. Angela was still left to teach the students on her own. In 2012 her principal required the teachers to stay with their classes in the science lab. Angela was a little scared of the idea of working and collaborating with other teachers because everybody is an expert in their field. She started team teaching with the classroom teachers and splitting the lab class in half. She was still concerned with how to be effective in reaching out to all of her students who come with different reading levels, different attention levels, and "brains that are all over the place." But she started to develop a good working relationship with her teachers. This year Angela's administrator told her that she is going to be a science leader for the classroom teachers, but did not give her a plan to accomplish that goal. This forced Angela to learn about collaboration, to not isolate herself, and to not be afraid to ask her peers. Angela feels like it is her job to be the role model for science, a poster child for the whole school, and to get the kids involved and excited about science. But she did not want to step on anybody's toes. Her administrator's directives gave her permission to go into classrooms and partner with the teachers.

Angela started going into the classroom to act as a resource for her fellow teachers. She has begun some small grouping and one-on-one interventions with students who need it.

One sixth-grade homeroom teacher asked Angela to work with a student who was struggling with science vocabulary. As they were finishing their session, the student asked Angela, “Okay, you’re coming in next Friday at the same time?” Angela assured her that she would. The student asked if they needed to shake hands or sign an agreement. Angela assured her that they had a gentlewoman’s agreement and that she would be there on the following Friday. Building relationships with the students helps Angela feel effective and have a sense that she has made a difference. Now teachers say to Angela, “You are an expert to us.” This has been scary for Angela to take on because there is so much she does not know about science. But she does know who to go to, who her experts are, so she has begun to feel more comfortable in that role.

Being present in the classrooms has helped Angela develop a positive working relationship and build trust with the teachers. Angela’s objective is to be a teacher. She does not have an agenda to become an administrator. She loves what she does. Communicating that to the homeroom teachers at her school has helped them feel comfortable with inviting her into their classrooms. Angela understands that the homeroom teachers know their students better than she does, and when she can collaborate with them, they can be more successful. Once she can collaborate with others and they are all on the same page then she feels like she can reach all of her students and feels successful as a science lab teacher.

Angela does not think that her position is permanent because it comes from Title I and a grant that was aimed at improving student literacy. She tries to treat each semester like it might be her last. She is required to report her work throughout the school day for grant accountability purposes, which allows her to demonstrate the value of her position and justify everything she does.

One advantage Angela sees to being in a position like the science lab teacher is the ability to see the overall curriculum picture whereas classroom teachers are zoomed into their own grade level. For example, at different points in the WSISD curriculum fifth-grade students are learning about stream tables, fourth-grade students are learning about weathering and erosion, and third-grade students are learning about landforms. When Angela started her position, she taught each of these grades separate lessons at different points in the year. A science administrator said to Angela, “If you’re going to teach weathering, teach it across the board.” This gave Angela permission to shift the scope and sequence in her lab classroom. She is now able to look at curriculum and see how she can tie it together and make connections to what students do in their homeroom. She feels it is her job to pull it all together. Because of the connections they make in the science lab, students will go into fourth and fifth grade with a deeper connection to landforms, weathering, and erosion.

Being a science lab teacher and a resource to classroom teachers gives Angela a sense of pride and she knows it is a big responsibility. She loves her job and is passionate about her students because this is the only time that she gets them. Angela feels she has to make a difference. She is always thinking, “It can always be better. That’s what it was, but next year it will be better.” Angela believes she has a product and the product is earth, her students’ community, and their town. Her students are going to be citizens one day. They are going to be responsible adults and she feels like she has to instill an awareness of the earth and a sense of stewardship in her students. She loves where she is and she truly enjoys what she does.

Steven: I love it even when it stinks

Steven has taught for 17 years. He received his teaching certification through his

degree in elementary education at a liberal arts college. He has taught fifth grade mathematics and science at two different schools within ESISD for 16 years. This year Steven is an environmental science teacher and teaches all students in kindergarten through fifth grade at Green Elementary. He works with each class two days in a row every two weeks. Green Elementary originally had a garden installed in 2010 and it was enhanced in 2013 when the school was renovated. The RSG partnership has supported them in the form of funding, supplies, and professional development opportunities since that time. Steven has always been the garden coordinator of both of his schools.

Steven was born in a small town in Oklahoma with a population of approximately 5000 people. For his last year of elementary school he moved to a slightly larger town where he lived until he graduated. After high school Steven entered college as a psychology major. He wanted to be an elementary counselor but did not fully understand what that meant. He knew that he wanted to work with children and thought of a counselor as someone who works with troubled students. He began his work in education when he learned that to become an elementary counselor he must be a teacher first. His university, a small liberal arts college, had an outstanding teacher education program. This became evident to him when he started his career with another new teacher who went to a large university. While he worked on plans for his class, she would ask him, “How do you know how to do that?” His response was, “School! What did you do at school?”

Three professors who were positive forces in Steven’s education program taught science, social studies, and language arts. Steven credits his elementary science education professor with opening his eyes regarding teaching. On the first day of the semester, the professor divided the textbook, put the students in teams, and never did any didactic teaching

for the rest of the semester. Steven and his classmates taught their assigned section as though they were teaching young students while their professor observed from the back of the room. After they taught their lessons, they were asked to reflect and talk with classmates and the professor regarding the lesson content and pedagogy. In that class he learned to build copy-paper boxes to hold all the materials for a unit so that everything he would need was available. A hands-on style of learning was new to Steven, different from anything he had previously experienced. This methods class, that included discovery learning and questioning, had a significant influence on the way Steven teaches today.

Some of Steven's other courses left a similar impact. His social studies professor also required her students to teach lessons. In this course, Steven and his classmates videotaped themselves and critiqued each other's lessons. He remembers that he hated building a large binder that contained an entire unit and lesson plans that were "20 pages long for a 10-minute lesson." His language arts teacher guided Steven and the other students through a scholastic book ordering catalog and told the class which books were good, which books were bad, and why. It seemed silly at the time but when Steven and his classmates left college they had books they could use in the classroom. Thanks to those books, lesson plans, and complete units Steven entered his first year of teaching with materials he could actually use. However, all his professors did not teach in this way, some of his courses were more theory based. It was the majority of his classes which were hands-on that molded Steven as a teacher.

In college Steven had the opportunity to participate in a grant with the National Geographic Society to receive additional training and experience in a fourth-grade classroom using the topics of geography and food. This was not Steven's only experience in the classroom during college. There were multiple opportunities to spend time in classrooms

observing teachers where he was required to take notes during his observations and to reflect on what he saw in order to discuss later with colleagues and professors. Those skills of observation and reflection impacted Steven who gets many of his biggest ideas when he walks into another teacher's room. Steven can instantly identify the flow of the room and the way it is designed by looking around the classroom.

Steven took 21 hours a semester in his third-year of college to try to finish his double major in psychology and education and became "burned out." He just quit. Steven met with a recruiter to join the Air Force. The recruiter tried to talk him out of enlisting immediately saying, "Great! I'll see you in a year, come back after you graduate and you'll be an officer." But there was no persuading Steven. He left school and joined active duty Air Force and married his high school sweetheart sooner than he had planned so that she could join him when he was stationed in South Carolina. Shortly into his service he realized that he really did want to be a teacher. While stationed in South Carolina, he went to school at a satellite campus of a university and finished the remaining degree requirements except student teaching. His courses in South Carolina were different from his experience in Oklahoma. Classes were more traditional, taught mostly by principals who "stood in front of the room and did most of the talking." Those courses did not leave a positive impression on him, but he only had to take a few to finish. He wonders if part of the difference was because the classes were at night and tailored to a different student body than the main campus of the university.

After 2 1/2 years of Air Force active duty in South Carolina, Steven switched to the Air National Guard to finish his service commitment and moved back to Oklahoma for a year of student teaching. His student teaching assignments included first and sixth grades in lower

socioeconomic schools. During his first assignment, his supervising teacher was hired as a counselor, so he took over as teacher of her first-grade class. Without the mentorship of a supervising teacher, he had to learn on the fly and found it frightening. The principal on that campus was attentive and came into his class to observe him. While Steven taught, she wrote notes on his lesson plan book with encouragement and recommended other teachers to talk to for help including a fifth-grade science teacher to whom Steven went with questions.

After graduating Steven and his wife left their small town in Oklahoma—where 1000 applicants competed for 10 teaching jobs—to come to Texas where teacher salaries were substantial. He was hired in the middle of the year, which was unheard of in Oklahoma. His ideal job was teaching first grade, but he was hired for a self-contained fifth-grade classroom position. He started teaching at Green Elementary with an open concept floor plan, meaning there were only partial walls. In February, a month after he arrived, the fourth-grade students were to take the writing test. On the day of the test, Steven conducted his teaching as usual. Early in the day teachers came to his area to tell him he was being too loud. He did not realize that “no one breathes on testing day in Texas.” In Oklahoma there was a different mindset about state testing.

Steven experienced other challenges understanding the TEKS and student expectations because many content topics did not align with Oklahoma requirements. Steven found support during his first year teaching from one of the teachers on his team who helped him plan mathematics as he guided her in science. He did not have the support he sees now for new teachers, where a mentor teacher works with new teachers during their first year.

Steven and his team of five fifth-grade teachers petitioned their principal for a year and a half to let them departmentalize or team-teach. Once everyone on the team agreed, they

were able to make that transition. It was then that Steven began his 15-year tenure as a fifth-grade mathematics and science teacher. Steven has always been drawn to science; it is his preferred subject. He is not sure why the mathematics. Science and mathematics just seem to go together, and were paired when contents were divided among the fifth grade teachers. He knew he did not want to teach language arts, so in order to get science, he taught mathematics. The Texas Assessment of Academic Skills (TAAS) that was in place when Steven began teaching focused only on mathematics and language arts and that emphasis was reflected in the school-day teaching schedule. Steven realized the importance of teaching science and planned lessons for his team.

When Steven started teaching science, he did not have a programmed curriculum to rely on. He was given the student expectations and the science book. He would plan his lessons using prior knowledge and anything else he could come up with. The technologies were different in Steven's early years; a copy machine had only limited availability. Steven relied on overheads and his chalkboard as his tools for teaching. Professional development played a critical role in his growth as a teacher. He participated in several intensive mathematics professional development programs over the summer and throughout the school year in mathematics. Because the timing never worked, he did not participate in a similar science professional development. However, his teammate whom he relied on for mathematics support, could attend the science workshops. Steven would attend the mathematics training, his teammate would attend the science training, and they would share materials, lessons, and other tools they brought back from their professional development experiences. Because of their collaboration it was as though Steven and his teammate had both attended each training.

Steven has experienced a variety of campus administrators. Consequently, he divides administrators into three categories: curriculum principal, don't-make-me-look-bad principal, and manager principal. Steven's first principal was a manager checking her Ps and Qs and dotting all her Is. She was a micromanager, but she did not micromanage Steven. Her style was very militant which fit perfectly with his military experience. As long as he got his job done, he was "all-good" with her. Steven next encountered a don't-make-me-look-bad principal whom he did not discuss in detail.

In 2005, when Steven moved to North Elementary to work with his wife, he worked with a curriculum principal. Steven saw a pendulum shift in education. ESISD adopted CSCOPE (not an acronym), a science curriculum model developed by the Texas Education Service Center Curriculum Collaborative in 2008 (Wilson, 2009). CSCOPE included detailed instructional units to guide teachers through teaching content. Steven's description of CSCOPE is, "You open up the book, you read, then you go down and you read some more." He had no interest in the new, highly scripted curriculum. Because of Steven's high test scores his principal did not make him follow the CSCOPE curriculum despite the push from the district. He followed the scope and sequence and stayed with the district calendar, but he taught his way. His principal, a curriculum principal, knew what needed to be done and let him be.

Fifth-grade students from Green Elementary had an opportunity each year to attend a local YMCA camp. The students and teachers spent a week hiking, boating, riding horses, and learning archery. The first year Steven went with the students, he was amazed at the things that excited them. They had never seen a horse! Steven, who grew up next door to horses, was sad to see all of the outdoor experiences his students lacked. Witnessing the

amazement, awe, and wonder from students who had never seen stars—real stars—floored Steven.

Steven brings a world of experiences to his teaching. In addition to growing up in the country in Oklahoma, Steven is a world traveler. In the Air National Guard he had the opportunity to travel to Germany and Antarctica. In Germany he saw a country that was extremely clean and has a history of recycling and using reusable shopping bags long before it was a fad in the states. In the major cities he did not see litter on the ground and there is a process to follow anytime anyone cuts down a tree. He deems Antarctica a “science wonderland.” Those experiences helped Steven focus his instruction on using the environment to teach. He was able to use his personal stories with his students’ at the YMCA camp to engage his classes in environmental studies.

In addition to the week-long YMCA experience, the district also has a nature center that every student goes to starting with a half day in first grade ending with a whole day in fifth grade. The former director of the nature center introduced Steven and a colleague to RSG. After an initial RSG meeting, the district’s partnership with RSG grew and Steven was able to work to install a garden on his campus. ESISD schools have partnered with the city and the Keep Texas Beautiful campaign for a long time. What started as a recycling partnership grew into an initiative for a garden on every school campus, spear-headed by the director of the nature center and Steven.

As a teacher, Steven always brought the outside into his classroom, dug up whatever he needed, and left his classroom filthy. In fact, he and his colleagues would joke that they were trying to bring “small town life” to their students. Where they grew up near farms, gardening did not happen in school, it was life. Now he was bringing gardens and chickens to

his students. The installation of a few garden beds gave him a place on his campus to take his students to learn outside, to see reality without smart boards, Internet, or big screens.

At the district level, Steven served as a curriculum writer for the mathematics department, which impacted the way he thought about teaching. Writing the curriculum forced him to look at the TEKS across grade levels and across the school year. As a classroom teacher he found that he only focused on his curriculum week-to-week or maybe month-to-month. Writing the curriculum for the entire year forced him to know it inside and out. When he took the curriculum back to his classroom, he was able to spin it or manipulate it in a way that worked for his students.

When the district implemented science strategists, his principals and fellow teachers thought he would be perfect for the job. But he was not interested in being a liaison between the district's mathematics and science departments and the teachers. He never accepted roles such as team leader because he felt it was just one more thing to add to his plate and take away from his teaching. He wanted to remain in the classroom with his students. He has never minded modeling lessons or leading workshops, but stated his place is working directly with students and noted, "Kids are more fun than teachers."

The implementation of high-stakes, standardized testing has impacted Steven's teaching. He can summarize the change: A principal used to walk up to him and say, "How is Susie? How is she doing?" Now, the principal walks up to him and says, "What are Susie's scores? What is she making? What is her percentile?" They do not really care about her well being so much as how she meets a "standard." He is generalizing, but for the most part, that is how he feels. He finds it harder to do things that are "out of the box" or out of order in the district scope and sequence.

District CBA's limit his opportunities to teach seasonally or in response to current events, such as a comet passing over. If he takes time to use current events to cover revolution and rotation as a comet passes by, he knows his students will not be prepared for the next CBA. His scores then would look horrible which Steven feels would falsely indicate that he was not doing his job. Steven said the high pressure and stress from these assessments ties teachers' hands and they end up doing cookie-cutter lessons; it takes away the ability to be creative and plan for their students.

Steven loves being creative and coming up with new and different ways to teach. He thinks many teachers from his generation entered teaching because they enjoyed being creative. Everybody has his or her own style of teaching and there is more than one way to be successful. Steven attributes his success to his passion and early education courses. Others have told him that he is a passionate teacher after they have watched him teach or lead a workshop. Until it was mentioned to him, he never thought about the way he teaches. In his room, all by himself, he did not know what every other teacher was like and assumed they were all like him. He knows that his passion, his ability to show that he is excited about science, rubs off on his students. Everything he does originates from that passion. His passion helps students think outside the box, make learning fun, and build his relationships with students to encourage excitement about science.

As a fifth-grade teacher Steven has had many students come back to visit after leaving for junior high and high school. One student returned in his Air Force uniform, which was particularly touching to Steven as a former Air National Guardsman. Establishing and building relationships with students has helped Steven be successful. Steven gets a great reward out of working with his academically challenged students. When his district started

including SPED students in regular classrooms the students were always placed with him. Steven came to education with a desire to counsel “troubled kids” and he understands that every child in one way or another has trouble. He knows that all students have a moment or a day where they need somebody to check in on them, to make them feel important, and help them learn. One of Steven’s former fifth grade students failed the grade-level test in both third and fourth grade. She struggled academically and had no self-confidence whatsoever. Steven’s ability to build a relationship with her and his addiction to watching a light bulb go off for his students helped him connect with her. Very slowly she began to see that she could make connections and accomplish her goals in mathematics. Throughout the year her self-confidence grew, she began to believe in herself, and she passed the fifth-grade mathematics test.

This year Green Elementary opened in a new building as an environmental science school. Teachers at Green Elementary were told, “We are going to tear down your old building, build a new one, and we are going to make you an environmental school.” As administrators and teachers started planning the school, many of the teachers called Steven to ask for his thoughts and ideas. Over his years in the district, it became clear that the garden was “his thing” and that he was the “go-to man” for questions regarding their new outdoor learning environment. Eventually the principal called him to ask if he would be interested in transferring from North to the new Green Elementary. Steven knew that something as big as the outdoor habitats they had planned needed to have an individual person spearheading them or they would all die. Over the years, he has seen that even with a small outdoor habitat the responsibility generally falls on one or two people. The principal asked him to write a job description that he would find ideal. He wrote two separate descriptions: one as a “specials”

teacher working only with the students and one as a “coach” where he would work directly with teachers and pull out classes during the school day. His principal presented both job descriptions to the district and ESISD agreed to fund his position as a specials teacher, just as they fund physical education, music, and art. He did not want to relinquish his time with the students so he was pleased with the choice and says now, “I have the best job in the world. And I can’t complain ‘cause I wrote my job myself. If I ever complain it’s my own fault.”

The students at Green Elementary have a specials rotation that includes physical education, art, music, and environmental science. He sees every student in kindergarten through fifth grade for a 45-minute class period two days in a row. It takes two weeks and two days to rotate through all 855 students at Green Elementary. He works with his students on the skills of planting seeds, harvesting vegetables, composting, and the content of life cycles, structures, adaptations, and more using components of his outdoor learning environment. He does not work with his teachers to match his curriculum with their science content objectives. Everything he does is based on TEKS but does not necessarily fit in with the district’s scope and sequence. For example, he has two weeks to get potatoes in the ground. Working within the district’s scope and sequence would make planting almost impossible.

Now that the school has gone through a “growing year,” Steven and his principal are considering changing his position. There are many times that he cannot attend to responsibilities in the garden because he has a class of students on his own. One example of this is the day the school received their second batch of chickens. Introducing new chickens is a slow, involved process. During those times Steven needed to be available to work in the OLE and not with the students. Steven sometimes also wishes he worked with the teachers

more directly. He knows if he were in a position to model teaching in the OLE with his teachers they may be more inclined to go out on their own. To address concerns like sick chickens, teachers' use of the OLE, and a ratio of 27 kindergartners to one Steven, his administrators are considering adding an aide or redefining Steven's job description, despite his hesitation in giving up time with the students.

The involvement of the community surrounding the school is important to Steven and his outdoor learning environment. At North Elementary, he had a group of mothers who came to the school to water the beds, walk the grounds, and keep an eye out for vandalism or maintenance problems. Now that Steven is not there to nurture the community relationship, the school garden has become susceptible to vandalism. At Green Elementary, neighborhood volunteers help to cover or uncover garden beds in response to freezing weather. The inclusion of community co-op beds in Green Elementary's garden space has helped build a relationship and give the community a sense of ownership regarding the Green Elementary School garden.

Steven has stayed in teaching because of the students. He does not want to give up his time working with the students, seeing them, and teaching them new things. He loves teaching someone something new. His job in particular is fun. It can be a pain, and it stinks (sometimes literally), but it is fun. The students are excited and enjoy learning with Steven. A drive to succeed helps him to be successful. There is a challenge to encourage the other teachers at Green Elementary to incorporate the outdoor learning environment into their regular teaching. He knows all of the teachers are trying to hook their students. Each hook is a little bit different, and so is each bait. He sees the power of the garden and finds the bait of the outdoors and the hook of the garden particularly well suited for elementary students.

Diane: Take a risk, outside or in, and do it better!

Diane has been teaching for 31 years. She received her certification through her degree in elementary education at a state university. She began teaching first grade at East Elementary in WUISD. During her time at East Elementary she taught first, second, and third grade. In her ninth year of teaching, she took a new position to open Applied Elementary in WUISD. At Applied Elementary she taught each grade level in first through fifth grade. She currently teaches fourth grade. Applied Elementary received a garden in 2003 and since then has partnered with RSG for support in the form of funding, supplies, and professional development opportunities. Diane took over as garden coordinator at Applied Elementary in 2009

Diane's childhood took place in a small town in Texas with a father and grandmothers who were avid gardeners. Her grandmothers' vegetable and flower gardens were beautiful and extremely detailed. A family farm gave Diane the opportunity to pick fresh vegetables such as peas, but from her point of view, she never really did much outdoors.

As Diane got older, her grandmother always wanted her to be a teacher. Her grandmother went to school in the 1920s to get her education degree and thought that being a teacher was a great job to have while raising a family. But Diane did not want to be a teacher. Diane went to a large urban university to get a business degree (a popular major in 1980). But the further she got into her business studies the more she hated them, and that had a big impact on her success. So her grandmother said to her, "Why don't you just take an education class?" She took this advice, enrolled in elementary mathematics and was amazed at how interested in it she was. Diane enjoyed her professor, her classmates, and appreciated

the small class size. She felt satisfied with the opportunities to go into classrooms and teach students mathematics. She then changed her major to elementary education with a minor in reading.

Diane found similar experiences in her other education courses. Smaller class sizes, hands-on learning opportunities, and relationships with her professors that she never would have seen in the business school. Her reading minor required Diane to work with first-grade teachers and students in a high-performing, affluent school for three semesters. Diane's student teaching provided a different experience when she worked in an impoverished area with first-grade students who had more challenges.

During Diane's student teaching, her supervising teachers amazed her. They were not necessarily the most compassionate people, but they were strong teachers with clear expectations for what should happen in their classrooms. During one of her student teaching assignments, she and a classmate worked with two teachers who team-taught. Both supervising teachers would open their doors and assist one another. One would teach a lesson and the other would move around the classroom helping students. The two supervising teachers were a dynamic team and were spot on. They hit the ground running and expected their student teachers to do as well. The experience of four adults working with 44 students was empowering to Diane.

When she graduated college in 1983, she applied to the district her university worked with as well as suburban districts in North Texas. As summer came and she still had not been hired she started applying everywhere, including the large urban districts in North Texas. She was offered a position at WUISD days before a school in her college city offered her a job. Diane honored her promise to come to WUISD and interviewed with a school on the east

side of the city at East Elementary. After the interview Diane was hired right away as a first-grade teacher. Since all of Diane's training in college had been at the first-grade level, she was thrilled with the position.

Diane's East Elementary students wanted to come to school because it was a safe haven for them. During Diane's first year, the other teachers in the school were a little worried about her. Due to lack of experience and unreal expectations, Diane's mentor teacher was supportive and patient with her, while Diane remembers thinking that she knew everything just out of college. Many of the teachers in the school had a traditional style and required their students to stand when speaking, which contrasted with Diane's style of teaching. Diane's principal said to her, "Just keep your door closed and just do you. I know you're doing the thing that is working. Just keep your door closed and people will be a lot happier."

Not all of Diane's leaders provided the same support. One principal at East Elementary was pretty tough. She had a gruff personality and tended to only point out things that were wrong. Diane knows that she had a kind heart and thought that she was doing good but sometimes that negativity made it difficult to be a teacher.

Diane started to get interested with project learning. With her students she built a table to display their science work. They covered their table in cheap, blue felt and laid out items they were studying. The table was not strong enough to hold too much or to lean on, but they made it and they used it to show their studies. She also got involved in the study of weather with her students. A weatherman from a local news channel flew to the school in a helicopter and worked with her class. Her students proudly presented weather maps and a mock weather forecast to him. With encouragement from one of her principals at East

Elementary, she collected aluminum cans to raise money to purchase plants for the school. She offered to buy pizza for the class that brought in the most cans. The last day of the can drive parents rolled in with trucks filled with beer cans. She will never forget the smell, but they made enough money to buy perimeter plants for a large section of the schoolyard.

As Diane started to work with her students and realized the power of hands-on science, she wanted to teach more science. She saw how excited students could be about the subject. Eventually she worked with the science department teaching in-services for teachers, which she loved. Diane also took a leadership role in the district by working as a peer partner for writing training. She enjoyed working with the district to provide trainings and act as a peer partner, but a change in schools eventually limited her opportunities.

A friend came to Diane to tell her that a new school would be opening in their district. She thought the applied learning school would be a perfect fit for Diane. Following a portfolio presentation and a roundtable interview, Diane was offered the job. After eight years of teaching at East Elementary she left to open the new school, Applied Elementary. Working together, teachers and school leadership developed a mission statement and spent a great deal of time getting to know each other the summer before the school opened. Experts came from New York to provide the staff with applied learning training. District administrators were very involved in opening of Applied Elementary, which Diane calls their brainchild. However, beyond the initial trainings they did not receive much support.

The teachers at Applied Elementary were not given a curriculum and did not have a great deal of materials in place; they were stepping out to forge a new journey. They experienced extended hours of professional development and committed a great deal of time to the new school. The first few years were overwhelming to Diane. Due to exhaustion many

teachers started having health issues. At one point six different teachers needed root canals! Teachers and leaders of the school relied on reflection to understand what was going on with the school and students, what was working and what was not. They looked for ways to evaluate their program and develop means to score student work. Diane remembers how hard it was to bear the responsibility of the growing phase. Parents were apprehensive. They wanted to be certain their children were getting a good education. To attend Applied Elementary, students had to submit an application. Most students were gifted and talented; their parents were not satisfied with the traditional education and were looking for a school that would push their students further. The teachers continuously looked for new ways to improve the school and better the educational experiences of their students. The staff who opened Applied Elementary in 1991 was a tight group and consists of some of Diane's best friends still today.

In the beginning, school leadership at Applied Elementary was different from a traditional model. The school had two teacher directors with teaching as well as administrative duties. Throughout the years the school went through several different configurations and eventually moved to a more traditional principal and assistant-principal model. Throughout transitions in leadership configurations, teachers' ideas and opinions were considered in decision-making. It was strange though; because, when you empower people you have to be careful with how it goes. Diane relates it to a situation she had in her classroom where her students took over a task when she asked them to help. This helped her understand that empowering people requires an awareness of how much power they may intend to take.

Teaching at Applied Elementary was never stagnant. Teachers were always looping with students, moving up to teach in the next grade level. At one point Diane started in third grade, went back to second grade and moved up with her students for the next three years so that over four years Diane had the same students. It was amazing. She could do more with her students because she knew them and their parents so well. They built rockets, they went to NASA as fifth-grade students, and shared many exciting moments. She remembers the stress, but she also remembers loving the opportunity to work with the same students for a period of years. At that point she really started moving, moving as far as what she was learning and what she was trying to do.

Diane knew early on that she needed more science content because her college career did not include many science courses. To deepen her content understanding she began attending science professional development at a local university that included an intensive summer training as well as academic year meetings. This training was different for Diane. She found that the instructors did not tell her what to do. Instead, she had to figure things out and was encouraged to share with her colleagues. They used hands-on materials, were asked to think and read, and were given the time to do so. As icing on the cake, teachers were paid for their time in the professional development. This got her more involved in elementary science and allowed her to share what she learned with other teachers at her school.

Diane tries to go to many of the science education conferences such as the Conference for the Advancement of Science Teaching (CAST) and National Science Teachers Association (NSTA), especially when they are in Texas. She reads to find information for students on Science, Technology, Engineering, and Mathematics (STEM) and gardening topics. Diane also relies on technology and experts to seek out content related

information. She recognizes the importance of making sure that she is not a teacher who enforces misconceptions in science, because many of students have them. She thinks that getting teachers as much material support as they can get is important to help them understand science content. She is not interested in a scripted curriculum, but she does appreciate having resources like Full Option Science System (FOSS) kits to go to with the materials she needs. FOSS kits are materials and curriculum provided to engage students in active science learning (FOSS Project, 2014).

Another influential professional development experience for Diane was her trip to the Teton Science School in Jackson, Wyoming funded by BRIT and RSG. She was struck by the idea that you can show students things in a hands-on way and that helps them with understanding. She was intimidated at the start of the trip. But during this trip she was able to experience first-hand planning and complete an inquiry activity. That experience opened her eyes to the idea that young students could engage in inquiry. She was struck by the beauty of the land and being in a new place. When she returned home, she realized and understood that she could do the same types of place-based, inquiry activities on her own campus.

Standardized testing has had less impact on Diane than it might have on other teachers. When she started teaching first-grade students, testing was not an issue. But as she moved up at East Elementary she remembers the third-grade writing test and the pressures for the students to succeed. When she arrived at Applied Elementary she brought the same philosophy about testing and found resistance. School leaders and other experts in applied learning fought against the inclusion of test preparation for the students. Whatever the teachers did in applied learning was supposed to be good enough that the students would do well on a test.

Applied elementary uses a scope and sequence developed by its teachers. However they are expected to complete the same CBAs as other schools within WUISD. Since their scope and sequence does not align with the district's, the teachers at Applied Elementary are constantly going back through and figuring out which TEKS have been taught and which have not to readjust and realign the scores for their own purposes. Diane and the other teachers at Applied Elementary approach testing as a genre versus something to prepare for. Working in this forward thinking school, in an encouraging environment with like-minded professionals, has had a positive impact on Diane and her career as a teacher.

After her first five years at Applied Elementary, Diane began to wonder how to do that job and still maintain a personal life. There was not one specific thing that sparked her interest to leave, but she started thinking that she could probably teach somewhere else closer to where she lived. She started applying for jobs and visited the neighborhood school, Midcities Elementary, where her son would have gone to fourth grade had he not attended Applied Elementary with her. After a brief visit, the principal at Midcities Elementary hired her on the spot. At the end of her school year at Applied Elementary, she was sad and held some regret but she felt the decision to move was better for her family. So she moved everything and cleaned out her classroom.

When Diane began at Midcities Elementary in 1996, she worked on a team with eight other fourth-grade teachers. There were no books in her classroom, so she had to buy more. She moved in her hamster and large aquarium and the other teachers in the school told her, "We don't do it that way here. We don't do hands-on science." Diane had to volunteer to evaluate and give feedback on products like FOSS kits because the other teachers did not want to incorporate hands-on science. Despite their resistance to her style of teaching, she

enjoyed the people she worked with and, fortunately, teamed with a teacher who was more like-minded. But it felt strange to her when only two of the eight classes were getting hands-on science. By March Diane was crying and her husband asked her, “What have we done?” When Diane heard the news that the teacher who took her spot at Applied Elementary was moving out of state, she immediately called the principal to ask if there was any way she would consider hiring her back. The principal’s response was, “In a heartbeat. We’ll clear your space.” So now Diane’s administrator jokes with her saying, “You can never leave because now you know it’s going to be rotten.”

Diane and her son returned to Applied Elementary in 1997, back to her self-contained fourth-grade classroom. Several years later Diane began team teaching with the fourth-grade teacher next door. Diane focused on mathematics and science and found that there is something special about teaming that allows you to specialize more. In 2013, after team teaching for many years, she was excited to return to teaching self-contained fourth grade. Changes in staffing in October forced a situation where Diane is now only teaching language arts and social studies. She misses science. Other teachers and parents come to her and say, “I can’t believe you’re not teaching science.” But she manages to squeeze a little science in and especially will, after the writing test and the potato harvest.

In 2003 Applied Elementary’s garden was installed and the school began its partnership with RSG. Until 2009, another teacher at Applied Elementary filled the role of garden coordinator. Diane took over the role as garden coordinator four years ago and started to think about how children today do not get outside much. She started to notice the students did not know much about the outdoors. Being in charge of the garden allowed her to see what a motivating factor it was. Some of her students, who were the most troubled and had the

hardest time learning, were exceptionally motivated by their garden as it seemed to change their whole point of view about school. They were excited about what they did in the garden and their opportunity to help the community. For Diane using the OLE is strictly about giving the students a chance to give back and to get their hands in the dirt. Parents have told Diane their students have come home and helped plan a garden, which she finds really exciting.

WUISD includes modules in their curriculum framework that encourage the use of the OLE for topics such as Earth Science. RSG has helped Diane with tips, tools and curriculum support to improve her teaching in the garden, as well as the trip to Teton Science School. One tip she especially appreciates is the use of the harmonica to get her students attention when they are outside. Having a garden and having the support of RSG and the Tarrant Area Master Gardeners has positively impacted Diane's teaching; so much so that she stood up and testified at an RSG meeting recently.

The Smart Potatoes program, which is a partnered initiative between RSG and BRIT, is particularly amazing to Diane. She remembers her grandmother growing potatoes but did not know much about them. Seeing her fourth-grade students excited to partner with kindergartners to harvest the potatoes thrilled Diane. All the students ran around as they used teamwork to harvest the potatoes. The students got out the wheelbarrows to compost the stems and leaves and to gather the potatoes. Throughout the garden she heard screams of "I found one!" When they took their harvested vegetables to the food bank next door she thought, "Wow, this is a really, really important activity." What may have appeared as chaos was a powerful learning experience.

Diane feels she has been able to be successful in the garden because she has been willing to take a risk, to go out there and try it. When Diane realized that the garden was a way to reach struggling students and that students easily jumped on board, it helped her see the importance of learning outside. She has found that her students love getting their hands in the dirt, they love learning by doing and writing about the garden. She believes students may have a story now where they felt like they did not have one before. Now she strives to learn more and more ways to use the campus garden.

Diane attributes her success as a teacher to being at the right place at the right time. She wonders if a teacher really ever is successful. She struggles with this and thinks if she ever really feels successful, then she is not moving forward and growing. There is always so much to try and accomplish and her ultimate goal which is the success of her students. She is her own worst enemy. She never thinks that what she has done is good enough, a trait she shares with other Applied Elementary teachers. Jumping in and taking risks to try something new is how Diane has improved her teaching. Willing to try and then reflecting on what works helps move Diane forward.

Diane has solid relationships with her students. Once she works through procedures, her class usually runs itself. She seems to have a way with kids. People have commented for years that her room is often quiet and orderly, but she is not one to yell at students. She knows that when she starts from the beginning with the right relationship with her students then she can be a risk taker. That has been difficult this year. A staffing change forced the addition of a class in the middle of the first semester. Trying to develop a relationship with a class that was unfamiliar with her, new to her procedures, and includes a number of high needs students has been a challenge. Some days are really great, and others make Diane want

to pull her hair out. The students are making progress, and the planning is becoming easier. She is looking forward to the challenge that the potato harvest will bring and is hoping her relationship with the students is established enough for them to thrive in the garden.

Diane says teaching probably saved her life. She knows that when she teaches she cannot let anything else come into the classroom with her. She says coming to school helped her through breast cancer and two hip replacements. During the day, she swore she did not have any pain at all because her mind was divided in 22 or more different ways. When she teaches she forgets about everything else. When her students witnessed her battle with cancer, they became more compassionate and wanted to help her, which empowered them as much as they empowered her.

Working at Applied Elementary has taught Diane a great deal. It is not always great, it is not always glamorous, sometimes it is frustrating. As an open-minded person who is willing to work hard, Diane feels being a teacher is a great profession because she is always “moving.” There is never a dull moment and it is never the same thing. Teaching is more than a job to her. She finds teaching satisfying and a great way to focus her energies. Diane still teaches because she is challenged by it. She knows that part of the challenge comes from the fact that Applied Elementary teachers are allowed to think and plan as a part of decision-making regarding the scope and sequence of the school. There is never a dull moment. Sometimes Diane feels like teaching eats her alive, but she loves it. Every once in a while, Diane toys with the idea of retirement. Her husband stops her, “Oh no you’d be so miserable! It’s just a part of your blood to teach.” He is right. Diane knows that when she gets it right—when she knows she has made a big difference in a child’s life and empowered them in some way—it feels good.

Kathleen: Children remember the experiences we can give them

Kathleen has taught for 18 years. Kathleen received her certification through her degree in elementary education at a state university. She taught self-contained fifth grade for five years at a small, private, catholic school before coming to EUISD in 2000. She then taught fifth-grade science for ten years at First Elementary before moving to a position with EUISD as a campus coach. In 2011 she worked as a science lab teacher and campus instructional coach at Oak Elementary. Oak Elementary had a garden but due to a grant, received a major renovation of the garden and began a partnership with RSG in 2013. In 2014 the school began receiving support from RSG in the form of funding, materials, and professional development. Kathleen has filled the role of garden coordinator during that time.

Kathleen grew up in Michigan and hated school as a student. Because of her learning disabilities, she was labeled unteachable and undisciplined. School was a struggle. She had coaches who disregarded her and teachers who snuffed out any hope of her being a good student. Throughout her school career she can think of only three teachers who had positive impacts on her. She remembers a first-grade teacher who spent the time to get to know her and help her, a second-grade teacher who was creative and put her heart and time into her classroom, and a fourth grade teacher who took Kathleen's class to her farm and cooked lunch for them to help them understand where food comes from. Those three positive experiences shaped Kathleen as much as the negative ones. The negative years, when she had a stomachache and wanted to stay home, stuck with Kathleen. She remembers a third-grade teacher who after a test broke the class into two groups. Kathleen could see that there was a smart group and a not-smart group. Kathleen knew what smart was and she knew she was not

smart. She could not do what the other group was doing. That is when Kathleen said, “Oh well, I can’t do math. I’m just never going to be good at it.” She also remembers a fifth-grade teacher who was a public-shamer and the humiliation that was a regular part of the class. Those experiences, the good and the bad, helped her know that children believe what adults tell them.

When Kathleen graduated from high school and entered college, her parents suggested she become a teacher. She wanted to do anything other than that. She instead took communications arts classes to prepare her for a career in radio, television, and film. After meeting the love of her life in one of those classes, Kathleen dropped out of college to travel the world and “figure herself out.” She experienced life in new ways such as walkabouts in Australia with the Aborigines. Travel to special and sacred places established a caretaker mentality for Kathleen. She quotes African naturalist Baba Dioum who says, “In the end we will conserve only what we love; we will love only what we understand; and we will understand only what we have been taught.”

After Kathleen’s travels she found herself in San Francisco. She called her parents with the \$1.30 she had left in her pocket and said, “Okay. I’m ready to come home.” However, Kathleen’s parents told her that she had made a choice and left her to find her own way. So Kathleen and her now husband hitchhiked from San Francisco to San Diego, bought a sailboat and lived on it. In San Diego she decided she wanted to be an animal trainer at Sea World. Sea World opens a training program every year to one or two individuals. Kathleen missed the cut off and decided to join the education department to get her foot in the door. Working in the education department, she began to realize the animals at Sea World do not need training, it is human animals who need the training. Adults asked questions like, “I

know the Atlantic is saltwater, is the Pacific also saltwater?” She witnessed do-gooders pour water into the blowhole of a dolphin to help keep it alive because it “looked thirsty.” Tour participants actually believed Kathleen and her colleagues when they told them that the trees throughout the park were special trees from Papua New Guinea that produce music from their branches. As Kathleen watched visitors lean in listening carefully for the sounds of the magical trees (that was in truth music from speakers) she became scared. Scared that there is a generation of people ill-prepared to be caretakers of our planet. She realized that unless she taught them, people would never learn to love what is important. As an educator with Sea World she fell in love with learning and with teaching people new things.

Kathleen reenrolled in college in San Diego to earn a degree in education. Her pre-service training in California included cross-curricular, cooperative, hands-on, and inquiry-based learning methodologies. In the early 1990s this was recognized as groundbreaking. Kathleen and her classmates developed units in a collaborative manner as they considered how to incorporate each learning objective across all contents. Her student teaching experiences took place in a lab school on her university campus. Her first placement was in a second and third-grade split classroom where the students spoke four different languages. Three days into the assignment, her supervising teacher injured her back and was absent for the remaining weeks. The substitute teacher assigned to the class sat in the back of the room and collected her paycheck while Kathleen took charge of the teaching. Because of the lab school setting, Kathleen’s professors and classmates were able to observe her through one-way glass windows and offer critique and support. They saw the lessons she taught and how she managed student behavior. The ability to get feedback in the moment shaped Kathleen’s teaching.

After graduating, Kathleen returned to Michigan and she began teaching at a small, Catholic, kindergarten through 12th grade school. She taught in a self-contained fifth-grade classroom where her class size ranged from 7 to 13 students. Despite the small class size, she remembers her first year being overwhelming. She went home every night and said to her roommate, “I can’t do this anymore.” Her roommate told her each time to wait and quit on Friday. Then Friday would come, she would relax through the weekend, and go back to work on Monday. She was afraid of ruining her students lives and needed to be continuously talked into showing back up at school. She had no school-sponsored support as a new teacher and always felt only one step ahead of her students. She relied on textbooks and the school’s scope and sequence to teach all of her subjects which included language arts, social studies, science, and mathematics.

She calls the school community idyllic. The biggest problem her students had was showing up to school and finding their socks did not match. But the hidden truth of that tight knit community was that the priest was molesting students. He targeted a couple of her fifth-grade boys. She tried to tell the community members and parents that he spent too much time pulling the students out of her class and that it was not normal. She was met with resistance and disbelief rather than support. Uncomfortable with the situation and unable to go to her boss, the priest, for help, she left.

A college friend told Kathleen that if she moved to North Texas the districts would immediately hire her. In 2000 EUISD was giving teachers money to “sign on the dotted line,” so Kathleen did. She was not particularly drawn to science, but EUISD needed science teachers so she quickly became one. Kathleen started her job as a fifth-grade teacher to a class of 35 Hispanic, tough, inner-city kids in a portable building at First Elementary. She

received very little support from the school or district. With no curriculum in place to help guide Kathleen, she still felt just one step ahead of her students. Two years later, EUISD made a push for elementary schools to become departmentalized. Her original love was language arts but she quickly became the science guru of her campus. Through departmentalization Kathleen was able to focus on one area of expertise, which she now appreciates.

As the only science teacher at First Elementary, she found very little support for her content and she was left to figure out the best way to teach science on her own. She ascribes the autonomy of her position to experiences that tell her most adults do not understand science. She did not know if she was doing anything right until the test scores came in. Once those test scores came back, Kathleen was able to see that her students could apply their knowledge to a standardized test and that she had done her job. The test alone was the only feedback she was given as there was never anyone else in her classroom.

Kathleen had to learn science the same way her students did. She had to read books, interviewed experts, and continuously investigated her content. District professional developments helped her to take what she learned back to her classroom. She reflected on how she learned and remembered best and applied this to understanding her students. Focusing on what her students were taught in fourth grade and what they would be taught in sixth grade helped her align her teaching vertically. It was important to know what content she was responsible for teaching. The district trainings Kathleen attended were content, management, and pedagogy focused. Without classroom management nothing she taught would get through to her students, without deep content knowledge she could not take her

teaching a step further, and without good delivery she could not reach her students. EUISD professional development did a good job of meeting Kathleen's needs in all of those areas.

Thanks to professional development and personal experience, Kathleen was able to emerge from teaching just one step ahead of her students. She learned that if she taught her students how to think, then it did not matter what test was put in front of them. If she taught her students creative problem solving, how to ask their own questions, and the value in what they learned, they would be successful regardless of the assessment. Her experience showed her that she could teach from the textbook, but she could also branch out and make creative learning experiences where she got the same positive results each year. Her strategies included a model of cooperative learning where each student fulfilled a role, and differentiated instruction. Various other strategies originated from her courses in college. Gardner's multiple intelligences were a focus in much of her education which helped her think about her students and how each of them learned best. If her students learned best through music, they may have written a rap about weathering and erosion. For the students who learned best through movement she included activities like a food chain game where they went outside to run around. For others, she included research practice with reading and writing to meet all of her students' needs.

Kathleen realized that learning is not meaningful when only a book is used. Learning was meaningful when her students were given an experience. For example, a second-language learner cannot look up a word in a dictionary to understand its meaning. In order to understand a word her students needed experiences. When she could show them sediment carried from one place to another to be deposited they had an experience to attach to the

scientific words *erosion* and *deposition*. To enhance their learning, Kathleen included an mummification activity when her students studied a literature piece about Egyptian history.

Kathleen relied on the classroom and the OLE to provide experiences for her students. She included nature walks in her teaching and used the OLE to enhance their writing. Every subject, reporting category, and every strand can be tied to the outdoor learning environment. In the OLE, Kathleen's students could learn that matter is everything—solid liquid and gas—and that matter is affected and changed through energy. They could study energy in the outdoors, and how force moves matter. They could study the impact that organisms have on their environment, the resources of the environment, and how matter and energy cycles through ecosystems. The outdoor learning environment is a real-life example for her students. When students left her classroom able to make real-world connections and could say precisely, in their own words, why they came to school and what they learned, she was successful.

Feedback from others began to show Kathleen that she was successful as a fifth-grade science teacher. Her students often came back to visit her year after year to see how they could be helpful in her classroom. The vice principal from the middle school that First Elementary feeds once visited Kathleen to meet the teacher who was sending students so well-prepared for middle school science. Her students arrived at the next grade thinking at a new level, not just understanding content but also understanding how to think and how to solve problems. He attempted to lure Kathleen to middle school but she would have nothing to do with it. Kathleen knew she had arrived as an educator when a substitute teacher wrote her a letter that stated she would substitute any time for her because it was like she did not

even have to be in the classroom. Kathleen, too, could often just sit back and watch her classroom run itself.

Kathleen's classroom success did not go unnoticed. One year, her principal moved her to second-grade so that she could have an impact on science education at the lower levels. That year, the fifth grade science test scores at First Elementary fell from a 90% to a 40% passing rate. Kathleen was moved back to fifth grade in a hurry. The middle school teacher who replaced Kathleen for that year had a wealth of knowledge but did not share Kathleen's pedagogical expertise. The year Kathleen was moved back to fifth grade, First Elementary was assigned a district science coach because of failing scores. The division coach had a hard time seeing what the problem was because Kathleen demonstrated such effective teaching. Now that Kathleen felt confident in her classroom, she finally had support from her district.

Kathleen's success in her classroom did not protect her from the challenges of First Elementary School and the surrounding community. Her 10th year at First Elementary saw increasing gang activity in the neighborhood. One of the local gangs' initiation procedures required new members to set a church or school building on fire. Future gang members broke into Kathleen's portable and set it on fire. In a matter of 18 minutes all of her years of teaching were completely destroyed. That was when Kathleen looked to get out of that neighborhood and find something else to do. Kathleen took a position with EUISD for two years as a curriculum writer and district coach.

Three years ago, Kathleen was hired by Oak elementary as a campus-based instructional coach. Her position is officially one that focuses on working with teachers to improve mathematics and science instruction; however, she has been told that currently the

focus is mathematics and they will catch up with science later. Every Monday at Oak Elementary is “professional development day.” When the focus is not mathematics or reading, Kathleen is able to provide professional development on science, which her teachers love. An example of professional development Kathleen has facilitated on her campus is to have teachers unpack the standards so that they understand what the verbiage of the TEKS really means and know specifically what students need to learn. Another professional development session focused on good first instruction. Kathleen says,

Good first instruction is like a good date. It is the date where you have things to talk about, you are intellectually stimulated, you are excited, and you want to be asked out again. It is the same for students. To hold their attention you have to make learning interesting and you have to do it in the first few minutes of instruction or they have wandered off to somewhere else. Good instruction has to start in the first minute of teaching.

Kathleen is proud of her school and the initiatives they have taken on while she has been there. The school is part of the Alliance for a Healthier Generation and only serves healthy, lean meats, no fried foods, and relies on produce from their garden for school lunches. The Alliance for a Healthier Generation was founded by the American Heart Foundation and the Clinton Administration to address the concerns of childhood obesity (Alliance for a Healthier Generation, 2014). The students at Oak Elementary do not have outside areas to explore beyond the campus. There are a few parks in their neighborhood but they contain homeless people, vagrants, and addicts. The students find syringes and broken glass on the ground. While the neighborhood is not safe, the schoolyard is.

Oak Elementary, Kathleen's first school with a garden, has had garden beds for several years. In 2013 was awarded a grant that Kathleen wrote for \$75,000 to update their courtyard. The additional garden beds, water feature, rainwater collection system, and shade structures provide an enhanced experience for the students to grow and watch living and nonliving systems interact. Kathleen encourages the teachers on her campus to use the garden space. Prior to their upcoming school-wide training in June of 2014, Kathleen has been working with the teachers to show them the little ways they can come to the garden space and make learning meaningful whether they teach writing, social studies, science, or mathematics.

Kathleen never wants to forget what it was like to be a new teacher on a campus. She spends most of her time working with new teachers and helping them with effective teaching. Kathleen told a colleague, "I wish I had a *me* when I was teaching." New teachers on campuses in EUISD have campus-based coaches who will help them design and make sense of the standards, align activities, and work on assessment. District coaches are available to inexperienced or struggling teachers to walk them through the process of planning for their classroom.

EUISD provides teachers with the state standards and a curriculum. Kathleen feels the district has done more to free teachers from a restrictive curriculum but is not sure that they are ready for it. Division leaders have developed calendar maps to give teachers an idea of how much time to spend on content and a means to look forward to how content is integrated in future teaching. To further align the campuses, her division has created assessments for each campus to give on the same day. Students take standardized, curriculum aligned tests across the division. But the campuses, like Oak Elementary, have had their

interruptions in instruction. Students at Oak Elementary went to the Museum of Art, visited the symphony, and had an author visit campus. These experiences, which Kathleen knows are necessary and important, affect the instructional calendar and she knows students on her campus will not be prepared for the tests they take.

EUISD has implemented many changes with the hiring of a new superintendent who Kathleen knows has overwhelmed many of the teachers on her campus. The biggest complaint they report is not having enough time. The district asked the teachers to focus on lesson objectives and display them using kid friendly language. Kathleen sees this as a way to focus the students and the teachers, but the teachers on her campus see it as extra work. Some of the teachers Kathleen works with see the prescriptive nature of the new initiatives as stripping away their freedom. Other teachers she works with see the initiatives as a restating of what they should already be doing in the classroom and have responded positively to the changes. Kathleen believes forcing teachers to think about their objective makes them better teachers.

As Kathleen has taken on leadership positions she has been able to see how ineffective teachers affect attendance, behavior, morale, and all aspects of the school culture. Effective instruction makes the most difference in student performance and so her goal is to affect how teachers teach. Kathleen spends some of her time in classrooms observing teaching so that she can provide feedback and help teachers on her campus. Some of her observations make her want to jump out of her seat and take over the classroom. She recognizes the disservice that ineffective teaching is to her students and sometimes misses her classroom. But she is able to see how being pulled out of the classroom into her role as a leader will impact and affect more students. So instead of taking over the classroom she stops

to think, *how can she turn out one more teacher who has a greater impact on student learning*. Her job calls her to do things that she is not completely comfortable doing. She has to have conversations where she cannot be nice, she has to be direct. It is hard, but she is growing as a person because of it.

Kathleen is a teacher because she was called to it. She says we all have a calling and teaching is hers. Some people are called to help sick people, drive trucks, remove garbage, or plant seeds. And she was called to teach. It is more of a calling than anything else to her. She cannot imagine doing anything other than this.

Chapter 5

Findings-The Voices Across Six Themes

Research about the professional life histories of teachers who are effective in the classroom and in the OLE primarily focuses on the participants' development as teachers. Relying on existing literature on teacher development provided a starting point for the analysis. The primary codes used in the analysis of the professional life histories of the participants were taken from a framework for teacher development for pre-service teachers and is built upon previous research in the field of teacher learning (Hammerness et al., 2005). The authors wrote that teachers learn to develop understanding, practices, tools, dispositions, and vision within a learning community. Beyond the themes provided by Hammerness et al., (2005), I continued to analyze the data to construct secondary themes of their development as teachers. In this section I discuss the evidence for the themes of teacher development constructed from of the professional life histories of the participants.

Vision

Teachers' visions are the images of what is possible. Vision helps teachers "reflect on their work, guide their practice, and direct their future learning" (Hammerness et al., 2005, p. 386). Teachers' beliefs of what is possible shape their goals for teaching and eventually their classroom practices. Statements of visions may indicate past thoughts of future possibilities for themselves or their students. Across the professional life histories of the participants, two secondary themes within the primary theme of vision emerged: impact on students and children as conservationists.

Impact on students. The first theme within vision was one of impact on students. Here the participants expressed ideas regarding the possibilities of their impact in the future lives of their students. Angela recognized the brevity of her time with her students and focuses on the importance of making a difference in their future.

I love my job. I'm very passionate about my students (be)cause I feel like this is the only time I've got them. I got one shot (laughs) even though I've seen some from first grade to sixth grade, that's still not a whole lot of time (be)cause I don't have them every day. So I feel like as a teacher that my lesson has to be the best each time I see them. I have to make a difference. (Angela, A1:81)

She also discussed how collaboration has made a difference for her students.

And this year I feel really I feel like an effective teacher because I feel like it's a working relationship...I feel like that we can just really reach our students if we work together. (Angela, A1:87)

Diane views the impact of her teaching in terms of how empowered her students are and, at the same time, recognizes that occasionally she has to be cautious of how empowered her students feel.

And when you get it right it's like really good. When you know you've made a big difference in a kid's life and empowered them in some way. (Diane, D3:58)

It's really strange (be)cause when you empower people, you have to be really careful with what with how it goes....The other day I had a situation where I asked the kids to help me do something and literally they didn't really (pause) what they did was they just took it on and they just went on and started passing everything out. It was just interesting to me and I thought that's the whole idea of empowering people You

empower people and then...do you really want them to be empowered to the length that it can go. (Diane, D1:99)

Kevin considers his impact on closing the achievement gap for his students.

We were just talking about what really needs to change is for the gap... the learning gap between (pause) what do they call it (pause) haves and have nots. If we would just have them come in the summer instead of having three months off in the summer, I think it would be shortened and not be so wide, (be)cause they forget everything. And the kids that get to go on vacation are probably reading anyway on vacation and the kids that don't aren't learning anything. (Kevin, K2:34)

Kathleen discussed how her position could impact the students of the teachers she works with.

Effective instruction does make the most difference in student performance. So again, my whole goal is to affect how teachers teach I also see how my being pulled out of the classroom into this role is going to impact and affect more kids. So even though I just want to jump up there and do it...how can I turn out one more teacher who has a greater impact on student learning. (Kathleen, KK3:16, 18)

Children as conservationists. Angela expressed a vision of children as conservationists when she discussed the reality of raising her own children in the city and extended it to the students she teaches.

I took them out (and) we got involved in outdoor activities and (I) always wanted my kids to be aware of the environment and animals and be stewards of the earth.

(Angela, A1:110).

I have a product and the product is earth, or their community, their town, (be)cause they're going to be citizens and they are citizens but they are going to be responsible adults some day and I just feel like I've got to instill that they need to be aware of the earth, we have to take care of it, we have to be stewards, and it's got to be maintained. (Angela, A1:82)

What I'm trying to do, and I did it a little bit last year and I'm trying to do more of it, where I'm inviting more of my students to do more citizen science activities at the park and testing water and teaching them more about how to build a trail or (pause) I've taken a few students but it's something I'm working on. It's a work in progress. (Angela, A3:24)

Kathleen, when referring to her experiences as a world traveler, applied her view of humans as caretakers to activities designed to guide her students to be caretakers.

African naturalist Baba Dioum who said, 'In the end we'll protect that which we love, love what we know and we'll know what we're taught' and so I thought if we're not taught to conserve, and to appreciate this planet, it is going to fall apart so hence our garden, our school garden, our recycling program, our clubs after school too. (Kathleen, KK2:6)

Understanding

For Hammerness et al. (2005), teachers must have an understanding of content and how to make that content accessible for students. A thorough content understanding requires that teachers have “a rich conceptual map of the discipline (knowledge); an understanding of how knowledge is developed and validated within different social contexts (methods); an understanding of how one can communicate knowledge of that subject to others (form)”

(Hammerness et al., 2005, p. 387). To understand how to make content accessible, teachers should have an understanding of their students including “students’ thinking, experiences, development, and learning processes” (Hammerness et al., 2005, p. 387). Finally, to ensure content is accessible to students, teachers need to understand how to construct curriculum and appropriately manage classrooms. The emergent themes within understanding across the voices of the participants were understanding of content, understanding of curriculum, understanding of children, understanding of science pedagogy, and understanding of OLE pedagogy.

Content. The participants expressed an early lack of understanding of science content and how they worked to deepen their understanding. Kathleen reported feeling “*just one step ahead*” (Kathleen, KK1:70) of her students regarding science content. Diane could not rely on her college coursework to prepare her for the science content she taught and Kevin preferred more scripted investigations in the beginning of his teaching in response to his lack of content understanding.

I mean I knew early on I needed a lot more science than I ever had cause I didn't have any really, I had the science that I used for a business major and it wasn't really it wasn't great. (Diane, D1:167)

I feel better when I know what's going to happen, they say you don't have to know why, but I just feel better to have an idea where you're going to go with certain things. Like when you do investigations and you kind of know where it's going to go so you kind of lead it that way. (laughs) But it's nice to know certain content. (Kevin, K2:45)

Angela, like Diane, discussed a need to deepen her content understanding.

There's so much I don't know about science, but I do know who to go to. Who my go to people are. So, I feel more comfortable in that role but it's taken me a while to do that. (Angela, A3:22)

Kathleen learned with her students, while Kevin sought out programs that were rich in science content.

I had to learn the same way they did. I had to read books, and interview others. (Kathleen, KK1:97)

I just learned a little bit more and had some more knowledge so I could talk about it easier with Master Naturalist, I could kind of start to think about how I could apply it to 3rd graders. (Kevin, K1:141)

Diane focused on finding content materials for herself and content materials she could also use with her students.

So there needs to be a lot more focus on (science content) so people know what to do. I just try to read a lot, I mean reading that science for children magazine is a wealth of information. All of the STEM stuff now is really big and just any (pause) just pretty much any I can get my hands on that I have time. (I'm) just trying to figure out how to do everything. (Diane, D1:168)

None of the participants claim to be science content experts currently and still seek out content deepening experiences, but they report being much more confident than they were early in their careers.

I feel more comfortable in that role but its taken me a while to do that. (Angela, A3:22)

Curriculum. Understanding curriculum has impacted the participants' teaching. Experiences in leadership and curriculum writing has provided all of them with an “*advantage of seeing the overall picture and the (other) teachers, they're kind of zoomed in their own grade*” (Angela, A3:65). Spending time working with the curriculum and TEKS gave the participants more first hand knowledge of student expectations.

It kind of forced me to know things inside and out and then when it came time for my own classroom I wasn't focused on (a single day). I could look at how I could spin (the curriculum) or manipulate it. (Steven, S3:10)

Although his understanding provided him with the opportunity to approach his teaching creatively, district frameworks and testing impacted Steven negatively. Kevin discussed the inability to integrate his science curriculum for more thematic teaching and how the framework provided a struggle for his students.

It's harder to do things that are out of the box, not necessarily in the correct order of the scope and sequence because of testing. (Steven, S2:35)

So if I could integrate (measurement) with math then I could have more time to actually practice it instead of just worrying about the CBA. (Kevin, K2:5, 50)

If...they teach measurement at the beginning...really at the beginning they're too young to be doing all that and in a 2-week period of time they're not getting to practice with it all the way through. (Kevin, K2:4)

Children. An understanding of children was well represented across the voices of the participants. Angela discussed not understanding her students when she began teaching regular education and the realization that she needed more professional development.

When I first started teaching science I just assumed that they knew what observe meant. (Angela, A2:46)

Here I am thinking everybody loves science, because I just kind of lived in this (pause) hole. Well, not everybody does. I'm talking about children. (Angela, A1:71)

Kevin's experiences helped him learn that his students have certain needs and Kathleen applied students' needs to expectations of their performance on standardized tests.

And I think that's one thing I've learned too is that (pause)...you have to point out those things to third-graders, why I'm here, why you make me happy, and why you need to pay attention. (Kevin, K1:108)

Here's the thing. If you teach kids how to think, then it doesn't matter what test you put in front of them. (Kathleen, KK1:80)

Steven described how his behavior influences his students, "It's just that being excited about things, it rubs off on the kids" (Steven, S3:17). Angela and Steven pointed out the challenges students face, although they approach them differently. Angela expressed an understanding of some of the challenges students face and how it affects her teaching and Steven finds those challenges rewarding.

How can we be more effective in reaching out to each of these kids that come with all these reading problems? (Angela, A1:116, 123)

I told you I like working with the gifted kids but I get more reward out of working with the lower kids...that kind of revived me for all the other challenges. (Steven, S3:42)

Kathleen and Diane reported how the OLE offers a respite for her students' struggles.

There are a couple of parks in that neighborhood. They are full of homeless people and vagrants and addicts....So it's not a safe place for them to be, but our space is a safe place. (Kathleen, KK2:15)

I guess the first time I took over being in charge of the garden here it really impacted me it was huge what the motivation of the kids. Just how motivated they were by it. (Diane, D1:8)

The most prevalent demonstration of the understanding of students comes from the participants' discussion of students' experiences. Angela learned to attend to her students' experiences and how they impacted how she taught.

I can't take for granted that all kids are all natural at learning outdoors, all kids explore the outdoors....I live in the city it's not like I live in a secured area. (Angela, A1:75)

I had to know what my students background was and their family background and what they were learning in order to make that connection when they came in because of the limited senses and their experiences (Angela, A2:22).

Kathleen talked about the benefits of students' experiences in teaching.

They come with wonder and they come with their own explanations for why things happen....That's kind of fun to hear their conceptions, their misconception of how things work so its always funny, it is wonderful. (Kathleen, KK1:95)

Diane and Steven discussed why it is important to include the OLE in the experiences of her students.

And then just the whole idea of starting to think about how our children today aren't really (pause) a lot of them don't go outside a lot. (Pause) I just noticed kids didn't know a lot about outdoors. (Diane, D1:7)

Just seeing kids and hearing kids that have never seen stars, like real stars. Their amazement, that awe, that wonder and (pause) they'd never seen horses....That just floored me and I'm like, 'This is sad!' It's sad. (Steven, S2:58)

Science pedagogy. The participants have relied on their experience and professional development to construct an understanding of science pedagogy. Diane was hesitant at first to include inquiry in her teaching, but after returning from a trip to Teton Science School she felt more confident.

I was intimidated at first. It was where I got to experience planning and completing an inquiry activity for the first time, and it really opened my eyes to that it could be done with kids. (Diane D2:2-3)

Angela discussed changes she has seen in science teaching.

When I reflect back on it and I think we have just really turned education upside down and in where's science going, that collaboration involved. (Angela, A1:95)
In science (be)cause you have to be able to listen to each other, your shoulder partners, and collaborate, take turns...kids have to learn how to collaborate and work together. (Angela, A1:122)

Angela and Kathleen discussed the importance of teaching beyond a textbook and Diane expressed the importance of student involvement in learning.

It's all about observations, comparing, contrasting, and they can't get that in a textbook. They have to feel the wind. (Angela, A2:51)

Because it's not meaningful in a book....Especially a second language learner, if I give them a term and they look it up in a dictionary it still has no more meaning to them than the word itself. (Kathleen, KK3:28)

I think many years ago another important time was when I realized the power of hands-on science and that just that seeing how excited kids could be about science really made me want to teach it more. (Diane, D3:49)

Steven is wary of implementing research-based practices but Kevin is still looking for a magic bullet.

We're only going to use things that are research based, that we have data, that we have proof for things that work. But every place is so different....We have different teachers, different clientele....Reality is totally, totally different. (Steven, S3:36)

Because I'm always trying to come up with some silver bullet that's going to tie everything together. (Kevin, K1:146)

OLE pedagogy. The participants extended their understanding of science pedagogy to the OLE to provide memorable learning experiences for their students that are connected to their curriculum.

(The garden) just reaffirmed how I teach. It didn't change it. It made it easier to teach what needs to be taught in real life. (Kathleen, KK2:16)

(Be)cause they remember it. Because it's more exciting because they see it first hand. (Kevin, K1:117, 123)

Definitely they should go outside I think (be)cause every single thing we just talked about could be completed outside too. (Diane, D3:39)

Understanding the importance of including the OLE in their teaching does not mean it is without challenges. Three participants recognize the challenges of OLE pedagogy for themselves and their colleagues.

I have to have separate goals and objectives for teaching children outdoors. (Angela, A1:77)

I think that's why a lot of people don't go out in the garden cause they're not as comfortable with it. (Kevin, K2:46)

I've noticed with the teachers that I work with the ones that feel most intimidated are the ones that have not had that opportunity or made that choice of going out and taking (professional development). (Angela, A3:34)

Tools

Conceptual (learning theories, frameworks, and ideas about teaching and learning) and practical (instructional approaches and strategies, textbooks, assessment, and other resource materials) tools help teachers connect their goals and intentions with their practice (Hammerness et al., 2005). Hammerness et al.'s (2005) definition aligns with Vygotsky's conception of tools as means for humans to learn from and make sense of their environment. Within the theme of tools, the secondary themes of assessment, curriculum, technology, pedagogy, and the garden emerged.

Assessment. Assessment represented a prevalent theme across the voices of the participants. Diane's school approaches assessment differently than other schools in her district, "*We approach testing as a genre versus prepping every day for the test*" (Diane, D2:13). For her, the format of the test can be taught just as she teaches poetry or expository

text. Standardized district and state tests have had an effect on the participants. On the one hand Angela, Steven, Kevin, and Diane have felt crippled by the stress and time constraints.

Fifth grade was the hardest grade I ever taught for two years because of the structure and the testing. And I tell you I felt like quitting honestly many times because I was under so much stress. (Angela, A1:51)

When I moved down here...you had the luxury of moving some things around and changing some things up. Well now I don't feel like you do. (Steven, S2:36-37)

If I don't teach it at the (right) time, then we take CBAs and it looks bad. (Kevin, K2:6)

What we forever have to do is the kids do the CBAs, we go back through and figure out which TEKS we've taught and which we haven't. And then we readjust and realign the scores in our own minds. But then as a teacher you're forever saying, 'Oh we haven't taught that yet.' (Diane, D2:26)

On the other hand, Angela and Kathleen indicated that assessment could offer guidance and feedback.

The testing is very good. I rely on the test results and the curriculum assessment test results (be)cause that shows us what the students are retaining or not and what we need to focus on for the next 2-3 weeks. (Angela, A2:72)

You really only felt like you were doing something right when those test scores came back in and you were like, okay something worked. Obviously they can apply their knowledge to a standardized test than I did my job. (Kathleen, KK1:68)

Curriculum. All of the participants struggled in their early years of teaching without a curriculum to rely on and Kevin, Kathleen, and Steven relied on textbooks to guide their teaching.

I just remember we didn't really have a whole bunch of curriculum and materials in place.....It was sort of like we were stepping out. We had to try to (pause) forge this new journey. (Diane, D1:76)

And you know we only really had a...book. And they had a curriculum guide in the book and so we read from the book. (Kevin, K2:41).

Heavily relied on . . . textbook, scope and sequence, I remember it I always felt like I was just one step ahead of the kids. (Kathleen, KK1:59)

It was here's the science student expectations here's the science book. Here's the math student expectations, here's the math book. So we would plan using that or using some prior knowledge or something that you came up with. (Steven, S2:48)

Some district administrators, responding to state testing requirements, have utilized state TEKS to construct curriculum frameworks for their teachers. District provided curriculum, and other pre-formatted curriculum, could be seen a useful tool or as a hindrance.

We've just given (teachers) the standards and given them the curriculum, a calendar map and said, good luck. (laughs). (Kathleen, KK3:45, 48)

I mean the curriculum framework stuff for earth science and with weathering and erosion, all those activities (are) really powerful. I've done that two or three years out here. (Diane, D1:156)

I'd rather be able to teach in my own order that way I could take advantage of certain seasons when you can plant, or when certain things are growing, or when certain things are happening. (Kevin, K2:2)

Because, when teachers (we're) given a curriculum, you have to do this, you have to do that. I've gone to Project Learning Tree, I've done Project WILD, I've done this, I've done that, and I really believe in those programs. And it was like it was getting further and further away. I can't use it (be)cause I have to do this, that was part of the stress I had. (Angela, A2:85)

Technology. The participants did not discuss newer technology, but did comment on the limited technologies that were available early in their careers and its use.

The interesting thing now that I reflect back, there was no technology. The technology-and I'm embarrassed to say-at the university that was available to us was videos tapes and video cameras. (Angela, A2:19)

There were no smart boards, there was no internet-not like it is now-and big screen where you could just pull something up and instantly show them. (Steven, S1:108)

I'll be honest when we started when I started we were still we had a copy machine but you didn't make copies of everything because it wasn't big enough to make copies there were still teachers that made dittos. I'm not that old, but there were teachers who were still doing dittos because there was a ditto machine there and it was a lot faster than the copy machine and that would break down a lot.. (Steven, S2:46)

Overheads. Oh my goodness I used an overhead everyday that was genius. I had a real chalkboard in my room. (Steven S2:47)

Sources outside of school districts provided curriculum-based tools such as single-unit lesson plans and activities as well as materials for curriculum use.

The latest (professional development) I went to at BRIT was an RSG thing and it was (pause) gave me some ideas. We just picked up rocks and looked for different kinds of rocks and then we built a tower and then we measured it. (Kevin, K2:15)

I also have a little ring of cards but I still know exactly where they are. They're like little things to do outside that are real quick. (Diane, D1:159)

At the end of each year we got like \$300 worth of manipulatives that we could use that were our own forever and ever. (Steven, S1:103)

Pedagogy. Pedagogical tools such as strategies taken from professional development provided tools for the participants as well. Diane picked up strategies from her trip to the Teton Science School with RSG staff, *“I think...having some tricks in your pocket like (using) the harmonica (outside). I tried yelling and clapping”* (Diane, D3:29). Kevin recalled strategies from ESL professional development.

He taught (us) how to teach ESL kids how to read in English, how to learn vocabulary, and used different strategies on the hand....Those were great things to remember when teaching math and science. I can remember all those kind of strategies that are used in ESL classrooms. (Kevin, K2:62-63)

Theories and ways of thinking about teaching and learning have also been useful pedagogical tools for the participants. Kathleen's pre-service experience influenced her while Angela has been influenced by her school administration.

There was this thing that was really pushed back in California. We were taught Gardner's different multiple intelligences and how kids learn best. (Kathleen, KK1:52)

Something our school is working on, is I do, We do, You do. And I really like that philosophy. So we've been doing that a lot in science because that's what it's about. It's a new concept. (Angela, A2:56)

Garden. Finally, the school garden represented a tool for the participants for more than just science content.

Once I got the garden I didn't have to go collect things, you know they were already out there. I still bring them in or we go do it together. (The garden) made it better because I can have that resource. (Kevin, K1:112, 120)

(The garden) gave us a place to go see, it gave us a place to (pause) it brought in reality. (Steven, S1:108)

The kids get to go outside and have that experience and watch things grow and watch things interact and ecosystems and living and nonliving systems. (Kathleen, KK1:85)

It doesn't matter if you're a writing teacher, it doesn't matter if you're a social studies teacher, there are ways to incorporate this space into everything that you're doing in class and make it meaningful. (Kathleen, KK3:27)

That's probably it, the garden has done a lot. (Diane, D3:50)

Practices

Practices are the integration of teachers' understanding and tools. Practices include a variety of instructional activities to promote student learning (Hammerness et al., 2005, 387). The voices across the professional life histories of the participants reflected themes within

practice of teaching that focused on student experience, student assessment, differentiated instruction, management, and the OLE.

Student experience. The participants reported the importance of providing meaningful learning experiences for their students including facilitating student connections and discussion. Angela is aware that her students' experiences with scientific practices and concepts are limited and Kevin seeks to extend his students' experiences into meaningful learning.

I had 3rd grade they're learning weather observations and that's what they don't have enough of, observing, they don't have enough experience observing, going out there and really observing the weather. (Angela, A2:49)

Well, and I used to collect stuff you know I'd go out to some field and collect stuff and bring it in like weeds or seeds or flowers or what I've got tons of bags of junk in that thing out there that I've collected its because I wanted to be able to show them instead of (pause) just looking at it in a book. So I knew that it would be better and more exciting (for them to see) the actual real thing. (Kevin, K1:110-111)

I got a thank-you note from my previous student teacher...she said, 'One thing I'll remember is how you make everything relatable to what you're talking about.

Everything is a learning moment.' (Kevin, K1:97)

The participants indicated that practices that provide students opportunities to connect learning to other experiences are important. The lessons Kathleen provided for her students connected them to what they were learning across contents.

Thematic teaching is better so that they'll learn it so they can kind of connect things together. (Kevin, K2:49)

Whatever they're studying in their vocabulary...they have a connection with the videos that they (watch) they have a connection with their reading materials and then a connection with science in hands-on (ways). (Angela, A3:60)

Cross curricular everything...what is that going to look like in social studies, what are we going to do in reading-language arts. We are going to use an expository text and can we teach summarization through whatever we're doing in science and then how can we incorporate that in math. (Kathleen, KK1:37)

Just as an example I remember we studied this literature piece called the Golden Goblin,-it was all about Egyptian history. And so we mummified Cornish game hens and I remember taking them outside and we were going to put them in the ground. We'd mummified them, (with) salt and cloves and we wrapped them in muslin. We were taking them outside to bury them in the ground and then we're going to dig them up and see how they'd been preserved. (Kathleen, KK1:74)

Angela and Kathleen reported facilitating student discussion. Kathleen highlighted the importance of discussion while Angela described a recent experience with her students.

(Teaching) has to include activities that encourage discourse, that make (students) think, that make them ask questions, that make them come up with more questions, their own questions. (Kathleen, KK3:38)

But then we're walking and I have a teacher behind me and the kids are really focused and we're forming a circle, and holding our wind vanes, and (I) get all kinds of science talk and (students) are making connections, 'Oh look at my arrow its pointing that way! Does the wind always stay the same? Does it not move? Oh it's moving.' (Angela, A2:52)

Student assessment. The participants described student assessment in their practice that went beyond the standardized assessments provided by their districts.

As far as always asking questions, I've always been doing that because I was always asking questions of my students. I had to check their assessment all the time. (Angela, A2:63)

Do I wait until the fourth week of the 6-weeks to test them? No, it's done in the moment. (Kathleen, KK3:54)

Diane discussed preparing her students by showing them what their learning activity would look like on a traditional assessment,

If we do a hands-on activity then we try to show kids what that type of hands-on activity looks like in a testing format. (Diane, D2:14)

Differentiation. Kathleen, Angela, and Kevin revealed the role that differentiated instruction played in their classrooms. Kathleen discussed providing choices for student learning and assessment.

You would see a lot of differentiation in my classroom (Kathleen, KK1:53). Giving students choices, I mean adults like to be offered choices, kids should be offered choices. But it takes more work. (Kathleen, KK3:39)

Angela recognized the struggle of individualized instruction in large class sizes. Angela's training in SPED and Kevin's training in bilingual education helped them to differentiate their instruction to meet their students' needs.

I was trying to individualize everybody because that was the way I was trained. And (pause) it was a struggle. (Angela, A1:40)

How is (individualization) translated into 27:1 or when you teach first through sixth-grade students? (Angela, A1:97)

I feel like I'm good at, well, teaching concepts, at my students level. And that was from the training that I had in special ed. Cause I had to get on their level my hands and knees and explain what some of these concepts were, so I had to change my language, and my vocabulary. (Angela, A3:67)

I think a lot of mine...has been ESL stuff too, or I was a bilingual teacher at first and so...some of the things I got from those trainings as far as how to teach language to people. (Kevin, K2:59)

OLE. The participants reported the OLE's role in their practices.

We have done almost anything and everything we can think of from planting seeds. We have done plant life cycle. We have done composting lessons. We've done oil spills with Freddy the Fish, conservation and recycling ... We did trees with the little kids. We did seasons with the bigger kids. We did some tree measurements and tree rings and actually figured out how to figure out the age and the height without cutting it down. (Steven, S1:76)

And our nature walks and going outside, there was a big giant tree in the playground and we wrote poetry, it was our poeTREE time and we'd listen and we'd smell and we'd taste and we'd feel. (Kathleen, KK1:75)

When we had that freezing temperature I took them outside and we sat on those benches even though it was 26°. We were talking about weather at the time. How else are you going to teach somebody that? I mean they wouldn't forget it probably. And as long as everybody is properly dressed I don't see a problem with going outside.

You know how sometimes its too cold to go to recess well we're out there usually during that time and there's nobody else out there which is GREAT. (Kevin, K1:98)

Kevin and Angela reported working the garden into their teaching and their teaching into the garden.

Whatever we're doing has something to do with the garden. (Kevin, K1:119)

So, I always thought whatever is in the classroom I could apply it outside. (Angela, A1:59)

I remember reading Aldo Leopold. He wrote something that said, 'There's as much science in a dandelion growing in the crack of the sidewalk as there is in the redwoods in Sequoia National Park' and I thought, yeah. . . it's true. (Kevin, K1:136)

You can go out there just on the playground and find stuff. There's a tree growing in the crack out there and I let it grow and the district hasn't cut it down yet. I'm surprised, its right up against the building too (laughs). (Kevin, K1:137)

However, teaching science, and especially teaching science outdoors, presented management problems for the participants, *"And then they have behavior problems, because they come to you and are 'Yay science, we're going outdoors, it's recess time'"* (Angela, A1:104). Establishing procedures for using the OLE was helpful for Diane, *"You can't just go outside and then tell them what you're going to do. You have to have a plan"* (Diane, D3:30).

Dispositions

Dispositions are "habits of thinking and action about teaching, children, and the role of the teacher" (Hammerness et al., 2005, p. 387). Within the theme of dispositions, the

voices across the participants reflected themes of passion for teaching, life-long learner, nature lover, persistence, reflection, and relationship with students.

Passion. Kevin, Steven, and Angela reported a passion for teaching that has helped them feel successful.

If I stay up here late it's because I want to do a great job it's because I like doing it.

(Kevin, K1:47)

I've been told that a lot that I'm very passionate about what I do. (Steven, S3:21)

I got this passion, I'm going to let everybody see it. I'm not going to hide it. I'm just driven by it. (Angela, A1:50)

To me everything stems off of that passion, once you have that passion for it, you're going to think outside the box you're going to make it fun, you're going to do it different ways. But at the same time you're going to build the relationship with the kids, get them excited about it. (Steven, S3:19)

Kathleen and Diane reported that their passion is why they do what they do.

Because I was called to do it. We all have a calling and (teaching) is mine....I can't imagine me doing anything other than this. (Kathleen, KK3:59)

Every once in a while I'll be like maybe it's time to retire and do something else. And my husband is like, 'Oh no you'd be so miserable.' He said it's just a part of my blood to do it. (Diane, D3:55)

For the participants, teaching and learning should be, and is, fun and satisfying. Kevin and Steven found that the students add to that fun and that satisfaction.

And it's fun! (laughs) My job in particular it's a lot of fun. It's a pain, and it stinks, but it's fun. (Steven, S3:47)

I have the best job in the world. (Steven, S1:2)

I remember thinking I really like this. It feels really good. (Diane, D1:31)

I find teaching very satisfying and it really is a great job to focus your energies on too. (Diane, D1:22)

I like being here. (Kevin, K1:20)

I kind of like to goof around and have fun so um and (the kids) are a captive audience (laughs). (Kevin, K1:38)

Kids are a lot more fun than teachers. (Steven, S2:32)

Life-long learner. The participants reported an awareness that they did not know everything there is to know. They described different methods they used to continue to grow in their fields.

I went to every single (professional development) that I could find. (Angela, A1:58)

And then I was hooked on that because I was trying to get as much training and hands-on that I could. (Angela, A1:69)

I think that's really for me what it's been about is I don't know a lot, so I read a lot or I ask people. (Diane, D1:10)

I think being here has definitely taught me a lot. (Diane, D3:60)

The participants sought out intensive professional developments, attended conferences for science educators such as CAST and NSTA, and relied on BRIT and RSG for professional development regarding OLE pedagogy. Their desire to keep learning has helped shape them as teachers, “*I’ve evolved. I hope I’ve evolved*” (Steven, S1:115).

Nature lover. The participants represent a love of nature as well. Angela’s love of nature goes back to her childhood and inspires the way she teaches.

I just love nature and I've always been an outdoor person....Nature has always been my back yard. (Angela, A1:1)

Well, okay, its because of my passion for the outdoors. (Angela, A1:46)

Kevin prefers outside to in and connects science and nature in his teaching.

I like being outside I'd rather be outside then inside. (Kevin, K1:31)

Most of the stuff I do is nature stuff....Most of science is that way. (Kevin, K2:56)

Persistence. The participants reported a disposition of persistence to work with students until they were successful. Angela continued to look for the best strategy to continue to meet the needs of all of her students.

And I thought, I'm embarrassed, coming from special-ed. I did all hands-on, coming in regular ed. and I had 27 third-graders and I was just totally wondering what's the best strategy? I knew what the best strategy was to teach SPED children but I didn't know what the best strategy was teaching regular kids and how am I going to meet all their needs? (Angela, A2:58-59)

I'm not being effective I CAN'T REACH EVERYBODY, this isn't the way it's supposed to be! (Angela, A1:107)

I said okay I'm going to come in the classroom and if you don't need me I'm going to walk into the second classroom and so I just started intermingling just talking with the kids. (Angela, A1:120)

I told the teachers I've noticed that you have some kids right here I could do some small grouping, is that okay, do some 1:1 intervention or group and they just embraced it. (Angela, A1:124)

Diane persisted through challenges to provide the kind of science education she felt her students deserved, despite resistance from colleagues.

Yeah I think I just remember wow this is really hard. This is I just remember thinking this is a really huge responsibility. Because there was a lot of trust too. I remember working really hard. (Diane, D1:108)

I had to volunteer to do the things to help out that really they didn't want to do. 'Well I'll do the hands-on FOSS kits so I can give feedback, somebody's got to give feedback, remember the principal said we got to give feedback.' But then that felt strange too because only two out of eight classes were getting hands-on science. (Diane, D1:128)

I did, I had to close my door. (Diane, D1:127)

I think jumping in when you don't (pause) when you're not exactly sure what its going to be...I think what's really interesting too is that for me I don't know that I've ever been really terrified to try something in teaching. (Diane, D3:27)

Kevin persisted through challenges of feeling unprepared early in his career and still searches for ways to make learning better for his students.

I wasn't ready for that first week when I literally a little boy ran away from me in the classroom and bumped his head in the locker and I almost thought that I had made a mistake and I seriously I went home and cried. (Kevin, K1:68)

Yeah I did. I stuck it out. (Kevin, K1:70)

I'm still trying to get it where it's perfect or where it really works well. (Kevin, K1:150)

It's hard some days (laughs). (Kevin, K1:106)

Kathleen's role requires her to push her comfort level to ensure the students at her school are getting the best education they can.

It's tough. It calls me to do things that I'm really not comfortable doing, our executive director came in on Thursday and said so how are things going, and I said this job calls me to do things, to have conversations, I can't be nice, I have to be direct, I have to be, I have to say things that aren't nice. It is hard and its, yeah, but, it's calling. (Kathleen, KK3:19)

For Steven, watching his students learn encourages him to not give up.

One of the things that was always asked of me when I first started teaching was why do you want to be a teacher, you know you had to reflect on this and I always called it-and I've heard other people use it too-that light bulb going off. I love that light bulb. I'm addicted to when I see that light bulb go off and a kid gets it and a kid finally understands. I just think that's the coolest thing. (Steven, S2:51)

I love teaching somebody something that they don't know. (Steven, S3:46)

Angela's persistence to provide the best teaching for the students in her school is also met by a need for permission to move forward.

I don't mean to talk about BRIT and RSG so often, but it made such a huge impact, they've been a big resource for me. And a lot of it is almost like they've given me permission to do some of my lessons. (Angela, A2:84)

And part of that was like wow! It's like I'm able to do this because research says outdoor education kids can work on their observation skills or make connections.

(Angela, A2:87)

I didn't want to step on anybody's toes. So when the principal gave me permission to do that I went on as a partner with the teachers. (Angela, A3:20)

I talked to science administrator and she...gave me permission to do that because this is a new idea for us. (Angela, A3:59)

Reflection. Reflection is evident in the participants' voices as well. Diane and Angela described the role of reflection in decisions about teaching.

I'm a pretty reflective teacher. And I'm my own worst enemy basically. I'm always thinking, 'Oh my, should I have done that?' And I never think that what I've done is good enough. (Diane, D2:47-48)

There was a lot of reflection and a lot of even our own metacognition about what was going on and was it working. (Diane, D1:89)

I'm a person that if something isn't right I'm thinking it's me and what am I going to do to make myself a better facilitator or teacher. (Angela, A2:31)

I think part of being a teacher is being really reflective. (Diane, D3:17)

Angela looks to her colleagues to reflect collaboratively.

And sometimes if there's a glitch and something didn't work I collaborate with that teacher and say 'Okay, what can we do next time or how can we reach this kid.'

(Angela, A1:88)

I always tell my teachers I want your positive comments as well as any critiques (be)cause that's the only way we can make this program better, and make it grow, and make our kids succeed. (Angela, A2:32)

Kevin's reflection is represented most when he plans for his class, "*I go back and look, it makes sense to go back and look at what you did*" (Kevin, K1:44). Kathleen reported

reflecting on her school experience, “*You kind of just try to think okay how did I learn best, what do I remember. That’s what I tried to do*” (Kathleen, KK1:71). For Steven, reflection was embedded in his pre-service training, “*And reflection. That was our thing. We had to reflect on everything*” (Steven, S3:39).

Relationship. The participants discussed relationships with students. Establishing and nurturing these relationships helped the participants understand their students’ needs and extend their opportunities for learning.

And so for example yesterday a teacher said, ‘Can you work with this student, they’re really struggling with vocabulary. She’s in 6th grade, and I just kind of sat next to her. And having that good a relationship with the students, I really like that. So I feel like I was effective at that moment, I made a difference. (Angela, A1:127)

Diane’s relationships with her students have helped her teaching and the management of her classroom.

I seem to have a way with kids I mean people commenting, they’ve been commenting on it for years cause when they come in my room is pretty quiet and pretty orderly but I don’t really yell at kids or anything I just try to talk to them. (Diane, D3:33)

I guess you can be a risk taker when you teach when you develop really good relationships with kids and you have procedures and they listen to (you). And then its not always perfect (laughs). (Diane, D3:35)

And realize that developing relationship with kids takes a lot of effort and they have to realize that they’re really important to you. (Diane, D3:40)

Relationships have kept Steven and Kathleen working with students.

I can't get away from those kids....Well like I said I struggled learning and I knew that teachers who took their time to make learning interesting so that's what I try to do. (Kathleen, KK1:48)

You mean other than the money? (laughs) I guess just the kids. Really. That's the same reason I've never moved out of the job I have, (be)cause I don't want to give up the time working with the kids and seeing them and teaching them new things.

(Steven, S3:45)

Community

Teachers learn to teach in communities. “Professional communities include those found in classroom and clinical settings, such as the peers and faculty candidates work with in their coursework and in student teaching” (Hammerness et al, 2005, 368). Communities also include the local and regional communities where the teacher learns practices. In this research, I have extended communities beyond their pre-service years to include those that the participants were and are members of as practicing teachers. The statements of community do not always indicate the participants’ feelings towards/of community, but often act to describe the community or lack of community they experienced. The themes within community represented across the voices of the participants include early years, pre-service, out-of-school, and in-service.

Early years. Kevin, Angela, Diane, and Steven grew up in communities that were influenced in significant ways by nature.

I did grow up around a bunch of nature I guess so I was kind of surrounded by farmland... and a creek and that sort of stuff so that's where we did most of our playing. (Kevin, K1:2)

So the backyard, there were no fences there were a few swings, but tons of trees (be)cause my dad was stationed in Virginia. So that's how I grew up. (Angela, A1:2)

I grew up with a father (who) gardened a lot and both of my grandmothers were avid gardeners. They had beautiful extremely detailed vegetable gardens as well as flowers. And then one of my grandmother's uncles owned a farm...so we went and picked peas and things like that. (Diane, D1:4)

For Kevin, Steven, and Angela being close to nature was just part of the small town life.

I used to joke because...we're trying to make this...where I'm (from) its just called life. It's not called school (be)cause that's the way we grew up on the farms, and being outside, and learning, and things like that, and gardening. It wasn't a school thing; it was life. (Steven, S1:118)

The participants' childhood-school community affected them in various ways.

Kevin's experiences in school influenced his future decisions regarding his career and the type of teacher he would become.

I had a really good teacher in high school that I took drafting. That class lasted three hours in high school and that was neat. We didn't just draw in there. We debated stuff and he was like an ex retired Baptist minister so it was really interesting conversations. He took us on cool field trips and things like that to different places that related to drafting if you wanted to get your degree in drafting. (Kevin, K1:5-7)

I think they made it interesting and (Mr. Matthews) drove my interest in other ideas about things...I've always liked history and political stuff. (Kevin, K1:40).

And (Mr. Smith), I liked history and he was always a nice guy. I had him in junior high and then he moved up to high school. He taught social studies and I liked social

studies so I think a lot of it had to do with my interests but also the ability to not just do one thing. With (Mr. Matthews) we did a lot of other things. (Kevin, K1:41)

If I hadn't been with (Mr. Matthews) all that time maybe I wouldn't have gone the drafting way, I might have gone a different direction. (Kevin, K1:125)

Angela's experience as a volunteer in high school is what inspired her desire to teach.

When I was in high school I attended a girl's Catholic school and we were required to do community service when we were seniors. So, the adjacent elementary school had a special-education program and I just signed up for it. I thought it's right across the street, I didn't have a car (laughs) and I just fell in love with working with children who are hearing impaired. And the rest is history. (Angela, A1:17)

For Kathleen schooling played an important role in how she felt about teaching and education.

I hated school because I had a lot of disabilities growing up, learning disabilities. I was labeled unteachable and undisciplined. Oh yeah, I really struggled in school. (Kathleen, KK1:3).

I've been going to school since 1973 and I can only think of three teachers who had a positive impact on me growing up. I had coaches who disregarded me and teachers who kind of snuffed out any hope for being a good student. (Kathleen, KK1:5)

What made me good was having good and having opposite of good. Was having good in the form of Ms. Carter my first-grade teacher who spent the time, Ms. Moore my second-grade teacher who (pause) was creative, and spent the time. She made the folder games, she made the center activities, she made the (pause) she put her heart into that classroom. Looking back I see that now. Having the Ms. Franks in fourth

grade that was good. (She) took the kids out to her farm, cooked lunch for us, and walked us around the barnyard and everything and showed us how things worked- where food came from, why do we have this. And then having the opposite of that- having the Ms. Hood in 3rd grade who said, 'We're taking a test today.' Then getting the results and saying, 'Okay, this group is smart and I'm going to work with them and this group isn't smart and you're going to work with my classroom aide.' I knew what smart was and I knew I wasn't smart. You're smart, I'm not smart, I can't do what they're doing. That's when I said, 'Oh well I can't do math, I'm just never going to be good at it.' Or having Ms. Jackson who would just...public-shamer, that was in 5th grade. I remember all of them. Our kids will too. You matter, everything kids (pause) kids believe what adults tell them. (Kathleen, KK3:22-23)

None of the participants discussed experiences in schooling that took them outside, "*I didn't have any classes when I was a kid where it would have been outside like that*" (Steven, S1:117).

The participants' families played a role in their decisions to become teachers. Diane and Kathleen's families encouraged teaching. Kevin's family supported his efforts, while Angela's parents questioned hers.

My grandmother always wanted me to be a teacher. She went to school like in the '20s and really got her education degree and always thought that a teacher was great job to do for family. (Diane, D1:16)

So when my parents suggested I become a teacher I thought Oh!...I wanted to do anything but that. (Kathleen, KK1:4, 6)

I was able to (enroll in alternative certification) because my wife had a good job. So I just did that and then got my teaching certificate. (Kevin, K1:36)

(Be)cause my parents would ask me, 'Why don't you go into nursing?' (laughs) 'Why do you want to teach special-ed? What is it?' (Angela, A1:29)

Later, Angela's husband and children provided support during difficult times in her teaching career.

But having to work through it and having that family support system. The situation that I was in everybody (in my school) was in the same boat. So that was really tough. (Angela, A2:28)

Pre-service development. The participants' pre-service development included some interaction with professors who relied on lecture and didactic teaching.

The professor was just lecturing, it was just a whole different way of training teachers. (Angela, A1:94)

Sit in a big room and listen to somebody talk to you about how to teach. Pretty much (be)cause they had big rooms, they were in these big settings and even if you were doing hands-on stuff you were in a big room with a bunch of people. They weren't usually small settings. (Kevin, K1:76)

Most of them were principals, and you know stand up in front of the room and do a lot of talking. But I only took just a few classes while I was there (in South Carolina) to finish up. (Steven, S1:36)

Many of their experiences at the pre-service level were centered on theory rather than practice. Although these experiences were useful, the participants lamented the lack of personal experiences.

We did a lot of theoretical, you know you learn about special education, you learn about ESL classes, and things like that. Really didn't have any idea about classroom management, even though they may have mentioned it and we may have talked about it. (Kevin, K1:67)

But there were some that were more pretty much theory. (Steven, S1:45)

When I reflect back and my college courses you know (pause) I think back and a lot of it was maybe in theory. (Angela, A1:94)

The ability to relate to their professors impacted Kevin and Diane and may have influenced their idea of teacher.

And I really liked the man that was my teacher. He was very motivating and I found I really loved math anyway. (Diane, D1:30)

And I remember going to the professor's house and that would have been something you'd never done in business school. (Diane, D1:35)

Then I met somebody that was in the college that was the head of the landscaping department and he was recruiting kids from the architecture department into the landscape department. And he was a real neat laid back kind of guy and he wore a herringbone jacket with elbow pads. (Kevin, K1:11)

The landscape architecture guys were a little more relaxed than the other professors. (Kevin, K1:12)

The methodology in Kathleen's pre-service community was, at the time, innovative and Steven's professor, who placed the responsibility of teaching on his students, molded his conception of teaching.

At the time it was great because back in the early '90s the Clinton administration recognized what we were doing in Southern California was kind of ground breaking: That cross-curricular approach, cooperative learning, hands-on inquiry, inquiry-based learning, the methodology. (Kathleen, KK1:29)

My science professor who taught...how to teach science in elementary education, he really opened my eyes. He came-in we had the book-day I we divided the book up and (he) put us in teams and never did anything the rest of the time. He sat in the back of the room. (Steven, S1:31)

You learned how good or how good you weren't. But then you had him to back you up. (Steven, S3:31)

The participants' pre-service development communities included observation in elementary classrooms, although those experiences were more limited for Kevin than Steven.

I had to do a lot of observations and-I know a lot of schools do observations-it was like every class. It was a mountain of observations where you started and it became more and more so by the time you done your student teaching you'd been in the classroom a lot. (Steven, S1:28)

We did go see classrooms to see how things were taught. (Kevin, K1:91)

Pre-service development experiences that focused on practical application of teaching skills were important to the participants.

So, based on my training I didn't want to think about it, it was really tough, (Dr. West) was tough (laughs) Based on that, he actually helped me out! (laughs).

(Angela, A2:17)

I felt really prepared when I left (college). (Diane, D3:2)

The social studies lady that recorded us and watched us and building units. We left that school with units already built, things that we could use. And that's where that girl that taught next to me she left (college) with nothing. She had nothing prepared. I had entire science units. (Steven, S3:32)

Same with the language arts guy, he went through the scholastic...and he would he would say this is a good book, this is a bad book, this is why this is good, this is why this is bad. We would literally order books. It seems kind of silly but when we left we had stuff we could use. We had books we could use and we didn't walk in with nothing. (Steven, S3:33)

The participants' experiences in student teaching were meaningful for them. Angela and Diane recalled the strength of their supervising teachers.

I think it was (be)cause the lead teacher was very good and she was real knowledgeable...I had a real structured experience the first semester. That was my role model and that was the way I functioned. (Angela, A3:10)

I had really strong supervising teachers in every instance. They weren't necessarily the most compassionate people but they were very (pause) they were just very strong teachers themselves. And their expectations for what should happen in their classroom-I mean they made it very clear, for me as a teacher. (Diane, D3:3)

I was just amazed by my supervising teacher. (Diane, D3:5)

Angela's second student teaching experience was not as positive.

And the other experience was different cause it was in a public school setting. And that was (pause) it wasn't any where compared to my first experience in the state school. (Angela, A3:9)

Not that the (second) one wasn't knowledgeable, it's that there wasn't any structure. Back in the day (laughs) So that wasn't the best experience for someone that's just starting out. (Angela, A3:10)

When they were asked what the most meaningful experience regarding their student teaching was, three of the participants described experiences that left them alone in the classroom without the community provided by a supervising teacher.

I think the second week I was there she had jury duty (laughs) so I was on my own. And so I didn't have any choice. But she had left a classroom that was very well disciplined and organized. They were my lessons but she had laid out a plan where it was workable and I had students that knew exactly what they were supposed to do and it was very well structured. (Angela, A3:8)

My first student teaching experience in a third-grade classroom my mentor teacher threw her back out and wasn't even there. There was a sub in the room but I was basically, well I take that back, Ms. A was there for three days, threw her back out and then it was like, good luck. So, I just kind of went I really was winging it. That sub that was in the room just kind of sat. (Kathleen, KK3:2)

My first school the teacher that I got she had just got hired as a counselor and she was on her way out. So it was like day one (mimics handing something) 'See ya'. So I pretty much took over the class, in the first grade class. That was frightening. So it was learning on the fly. (Steven, S1:50)

Because of a well-structured class, support from pre-service faculty and peers, and administration Angela, Kathleen, and Steven were able to be successful in their student teaching experiences, despite the moments alone.

When I did my student teaching at the state school...(be)cause I lived on campus and the teacher did too....She worked with me, and (pause) I just got to know exactly what I needed to do as far as communicating with the kids in sign language and we taught all subjects. (Angela, A3:7)

All the classrooms had a one way glass (be)cause it was a teaching campus. So we present a lesson, our advisor and all of our peers would be behind the glass watching us actually teach the lesson and watching us handle behavior issues and different things-kids off task and how we would present it. And we would come back and get feedback. It was right there in the moment. (Kathleen, KK1:32)

The principal there was a mazing. She came in, this was a small school, and she would come in. We wrote lesson plans in books-big, big books-and she would always come in and watch the lesson and she would write while she was watching. She'd say, 'Good idea, go see Mrs. so and so has done this before.' (She would) write little notes on that. (Steven, S1:51)

And there was a fifth-grade teacher on staff there that was like a big science kind of guru type person and so I went to him a lot and asked him like questions. (Steven, S3:4)

Out-of-school. The community Angela found out of school influenced the way she approached teaching and her confidence.

And so when I had opportunities like (pause) starting here. Once I had success in building this park and networking and building relationships and partnerships in the community-that's what empowered me as a person but also as a professional. (Angela, A1:47)

Because it was, all the sudden things just kind of evolved and then I started learning about different community resources and then that's what really got me on the band wagon. (Angela, A1:79)

Because I've always been a very shy person so and very intimidated by my administrators so it just happened. Starting to feel comfortable, starting to feel empowered by my resources. Educating myself. (Angela, A1:96)

Support from experts in the community helped both Angela and Diane.

I would contact the individuals that I knew in the community for help. I have a core group of friends that are experts in the field-like birding, or native plants. And I would invite them to come into the classroom. (Angela, A1:66)

So, having a garden, and having the support of the area Master Gardeners and having a person out here that worked with them. (Diane, D1:147)

Steven relies on support from the community to help manage the OLE.

One of the things that I want is community involvement I couldn't do it without them. As a matter of fact the beds I had covered-this weekend was real nice I had some people across the street come take the covers off. When I came up Monday morning I was livid. I wouldn't have taken them off for two days of sunshine when it was going to drop back low, but they came over yesterday and started recovering them. (Steven, S2:22)

The thing (is), (the) more these people are involved the less vandalism that type of stuff you're going to have That's what happened at (my last school). I left. I had moms come up in the morning and water. They looked, and walked around, and things like that as they did their morning walks. When I left it went away and they've

had vandalism problems and its just gone down hill. So to me those are my eyes and ears. (Steven, S2:23)

Kathleen and Steven were impacted by experiences in communities they encountered during travel.

I traveled around the world and I did a bunch of living in different places and lived in Australia lived with the Aborigines. (I) did all the walkabouts and everything trying to find myself. (Kathleen, KK1:8)

I was in the guard so I would teach and travel teach and travel and I saw a lot of the world. (Steven, S1:19)

(Germany) is clean. It's extremely clean. They've been recycling forever. They've been using canvas bags to go to the grocery store way before it was a fad here. And I mean you're cutting down a tree there, you there, there's a process you can't just go out and cut down a tree. You don't walk down the streets and if you're going to a major city, but even some of the bigger cities you don't see cigarette butts, and it was just really sad to me. (Steven, S1:125)

And then Antarctica-it was just a science wonderland. (Steven, S1:127)

For Kathleen, the community she was a part of early in her career helped her continue to face the stress of her first year of teaching.

I remember going home every night saying I can't do this anymore, my room mate would say well just wait. Quit on Friday and then Friday would come and I would have the weekend and I'd kind of relax and I'd go back to it on Monday and every Friday. The first year I had to be talked into showing up. (Kathleen, KK1:63)

In-service. Early in their careers, both Angela and Kathleen reported a feeling of isolation.

And then that's when I was thinking there's no one to talk to! (Angela, A1:78)

When you're a teacher you're not in a hole. You have to reach out and learn those skills. I look back, I think back right now, when I was a fresh out of college I think I was 22 and was very intimidated. I felt real intimidated by the whole work force. I didn't know, I thought I was supposed to know everything. (Angela, A3:28)

I didn't, it was again the same kind of feeling what am I doing am I doing it right and....I never really felt like I was given any feedback on what I was doing, there was never anyone in my classroom. I did my job and I left and just like everybody else. (Kathleen, KK1:68)

I think that first few years it caused me a lot of stress (because) I didn't know that it was okay, that I had permission to reach out to other people besides my supervisor. And (that) I could collaborate with other teachers or contact other teachers in my field. (Angela, A3:31)

Kathleen indicated that support for beginning teachers is far greater now than it was when she began.

Teachers today have more support than they ever had before I feel. Like I said in EUISD has just initiated we have two instructional coaches on campus, on every campus, math and reading. So (pause) they have a LOT more support today than we did back then. (Kathleen, KK1:67)

I was just telling a colleague the other day, I wish I had had a ME when I was teaching. Because now teachers actually have campus based coaches that will help

them design, help them make sense of the standards, this is what you have to teach, what activities are aligned with the standards, what are we going to do first, how are we going to assess it, lets write a common assessment. (Kathleen, KK3:6)

Although the other participants expressed a lack of community early in their careers, Kevin and Diane benefited from a peer mentor during their first years teaching.

My mentor teacher I still see, she's very elderly now. She was really sweet to me, and she was real patient to me too. I'll never forget I thought I knew everything (laughs). (Diane, D1:66)

I had a great mentor Mrs. King who passed away a couple of years ago. (Kevin, K1:18)

I got a lot of encouragement from her too. (Kevin, K1:51)

I was a substitute teacher for a while but for not very long. I probably did it five times and that still didn't scare me away (laughs). I learned by doing and by being in the classroom with my mentor and her telling me things to do. (Kevin, K1:92)

The participants reported their peer communities and teaming relationships established later in their careers are a resource for learning and collaboration.

I learned the most from my colleagues. (Be)cause we can learn from each other. That's why I enjoy going to BRIT and RSG cause I'm able to network with other teachers. (Angela, A2:83)

I love going to workshops, (be)cause a lot of time at workshops you get a lot of ideas from the people sitting around you sometimes more than what you're there for.

(Steven, S3:29)

Collaboration. I have to be able to collaborate with my peers and I think that's what helped me. It's given me strength and courage. (Angela, A3:27)

There's something about teaming that allows you to specialize more. (Diane 1:136)

Yeah, I worked with some really great people there. We actually ended up teaming and it worked really well for us (be)cause she was pretty open minded about things. (Diane, D1:123)

Mine was just the girl on my team that did the other part of what I did. (Be)cause we team-taught. She was a lot of my support in math and I was her support in science.

We planned together. She was my big support. (Steven, S1:87)

Collaboration in peer communities was not always easy for Angela and Kathleen.

It's kind of scary working with other teachers and you're collaborating (be)cause everybody's experts in their field. (Angela, A1:115)

(Be)cause most teachers are ego-maniacs with inferiority complexes. I think that (some think), 'I'm the teacher, I'm right.' I don't know all the answers. You did better than I did, what did you do that I didn't do? Look at your data, look at this specific, how are you doing it? Lets share ideas. But that's really hard. (Kathleen, KK3:43)

Angela's role in her school has encouraged collaboration and she relies on her school community to be effective as a teacher.

The key thing is to collaborate and once I've done that I feel like then I can reach the kids. We all have to be on the same page. (Angela, A1:86)

With me as a teacher, I don't feel effective in meeting the needs of my students unless I collaborate with my office staff-like my principal, my vice principal, my counselor-the homeroom teacher, and then there's me. (Angela, A1:85)

The participants described their roles as leaders in their peer communities.

And then some teachers would come to me and they would say, 'You're an expert to us.' And that was kind of a scary feeling to take on. (Angela, A3:21)

When I did all the science training a big part of it was (coming back to school and) sharing lessons. (Diane, D3:12)

(Be)cause I planned the science. Even the year when we were self contained I planned the science for everybody. (Steven, S1:60)

When we first went to the science test for the district I did science workshops. (Steven, S2:30)

When the situation at the school level was stressful or difficult, Diane and Angela described their peer communities struggling together.

But this particular person was always on my back, but not just me, everybody. We're teaching and crying. (I had a) teammate (who) quit in the middle of the year. It was based on the survival of the fittest. We're all in it together....That was not a good experience. (Angela, A2:27)

(A lot) of people started having health issues. There would be like six people that needed route canals. Starting a new school is a huge thing to do. To try to figure it all out. (Diane, D1:82)

Trying to figure out how to help each other. And there were some really emotional times. There were some times where people felt like things weren't handled right. (Diane, D1:97)

The challenges of starting a new school together created a community for Diane that resulted in long-lasting friendships that have shaped how she thinks about teaching.

Being a part of a school that was really forward thinking which moved us into a lot of different areas. (Diane, D3:21)

I've been through some rough things in my life and coming to school has really allowed me to put those things in perspective too. (Diane, D3:62)

I taught through breast cancer I taught through a lot of different things and it's probably saved my life. (Diane, D1:24)

I'll probably start crying. We were very tight. We were very tight. And still some of my best friends have retired but we're still best friends so. (Diane, D1:95)

The school community helps encourage Kevin and his colleagues to incorporate the garden into their teaching.

I think its just woven in to teaching science and we do pretty good science wise cause we have our kids know a little bit more about their surroundings. (Kevin, K1:132)

When the garden came here and (the principal) pushes it. I talk about it every once in a while. She usually has an in-service starting with the garden with me doing something or (another teacher) did something with me one time. I think that kind of kept it in everybody's eyes to know that it's there. (Kevin, K1:134)

The communities formed by the administration of the participants has affected them differently at distinct points in their careers. Angela, Kevin, and Diane reported supportive and encouraging administrators.

My administrators have always been real supportive. (Angela, A1:61)

The principals were always encouraging. (Kevin, K1:21)

For the most part I felt pretty supported. I'll never forget my first year there. The other teachers, I think were really a little bit worried....I'll never forget (my

principal) said to me-(be)cause they would do things like kids would have to stand to speak, really traditional things-and so I remember she said to me, 'Diane, just keep your door closed, just keep it closed.' (laughs)She said, 'I know you're doing the thing that's working. Just keep your door closed and people will be a lot happier' (laughs). (Diane, D1:64)

(My principal) was always super encouraging about what we did and she would do let you do a lot of things. Like come and tell me about the garden...but she was always well organized. She also patted you on the back when you did a good job. (Kevin, K1:60)

I can think of a principal in my career in regular ed. who was very supportive to me as a teacher. And that made a huge difference. As far as working relationship with parents-like a cheerleader. (Angela, A2:23)

The pressures of high-stakes, standardized testing seemed to influence the community established by some administrators in Angela, Diane, and Steven's experiences.

And then there is another situation where I'm starting in a new school somewhere else and the collaboration wasn't there. And that was very difficult because everything was based on passing the test-getting your scores.... And that was very negative. It was more like working for Hitler. (Angela, A2:25)

I think just her . . . I don't know if it was her (pause) personality. She was very, very gruff, and very the kind of person that only pointed out things that were wrong. (Diane, D1:71)

She was a manager. She was just a manager and she needed everything the p's and the q's and the I's and everything checked and dotted and all that good stuff. (Steven, S1:98)

But this particular person was always on my back, but not just me. Everybody. And we're teaching crying, (we had a) teammate that quit in the middle of the year. It was based on the survival of the fittest. We're all in it together. (Angela, A2:27)

Leadership styles that provided teachers with autonomy supported Steven, Kevin, Angela, and Kathleen.

Education had changed, we were on this pendulum, and it was everybody do this. We had gone through a curriculum thing and then we went to CSCOPE. And when CSCOPE came out it was ok you open up the book and you read and then you go down and you read. And I'm like I'm not doing that. Ain't no way in the world. But it was a big push from the district, you will do it like this cause we need to see our test results and all that. Well, I had all these really high scores and it was because my principal didn't make me do that. I stuck with the scope and sequence, I stuck with the calendar, but I did it my way. And she let me do it my way. She was a curriculum person though, she knew what was supposed to be done. (Steven, S1:96)

She lets you pretty much do what you want to do if you ask her. (Kevin, K1:61)

Pretty autonomous. Yeah. (Kathleen, KK1:108)

So as long as I stayed in the curriculum it was okay with my administrators. (Angela, A1:57)

Angela considers her administrators to be experts who she relies on for help and support.

I rely on my supervisors because they've been to all the training and they know all the testing procedures are they know the strategies. They have an idea, they got their doctorate. I rely on them to lead me in that direction. (Angela, A2:69)

For three of the participants, it was administrators who gave them opportunities to incorporate the OLE in their teaching. Encouragement from one of Diane's administrators led her to start a school-wide project for the OLE. Angela, Kevin, and Steven were introduced to the possibility of a garden on their campus through their administrators.

She really encouraged me to get involved...we actually bought enough perimeter plants for that whole section...(and) we planted them. (Diane, D1:57)

The principal came and was like, 'Would you like a garden? We got a chance at the principals meeting we had some foundation come and talk to us about getting grants to people for gardens.' And I said, 'Yeah Great!' (Kevin, K1:28)

The same principal, this is interesting (be)cause I forgot about it! He noticed that I liked taking the kids outdoors over there at the school, and he said 'Hey I got this letter from RSG.' At that time nobody knew who RSG was and he says, 'Just look at it.' And I thought, wow! This is too good to be true! (Angela, A1:22)

The (director of) the nature center, her goal before she retired was to have a garden at every campus. (Steven, S1:71)

The participants reported in-service development as important community experiences. Diane and Steven recalled intensive professional development sessions.

It was spring and then summer and...I remember I drove there one day of the week and then we went like for so many weeks everyday in the summer. (Diane, D1:184)

And they didn't really tell you what to do. You had to figure things out and then you had to do a lot of sharing. I can't imagine what the training would be like today.

(Diane, D1:180)

One of the biggest professional developments that I did that helped me early on was actually math, not science.... We went once a month and we met at the ed. center.

Then I had to take like two weeks in the summer. (Steven, S1:100)

The community found at district in-service development impacted the participants as well. Kevin struggled to find district provided professional developments that appealed to his desire to teach in the outdoors. But, Kathleen and Angela reported that their districts provide useful professional development for science teachers.

Well, I don't know. It's just (pause) they're (pause) I can't think of any of the science ones that I've been to that take you outside in the district, that were ones right after school. Usually they're doing soil inside the classroom or doing something (else) inside the classroom. (Kevin, K2:18)

Things I've taken in the district...anything you do it kind of triggers something whether you're sitting there and you're bored and you're trying to figure out some way to connect it. (Kevin, K1:142)

Trainings were helpful. I tried to take a lot of what I would learn at district trainings and bring it back into my classroom. (Kathleen, KK1:71)

I went to a workshop with the school district. The science department had a grade level come in and do the workshops on science. And I thought, wow this is really great. They did the research for us. (Angela, A2:64)

The in-service professional development provided by BRIT and RSG were important community experiences for Angela, Diane, and Kevin.

And then, I found out about BRIT because a group I was in had field trips and they said let's go to a place called BRIT. I just went cause I thought it was interesting to look at dead plants and see what that's all about. Then when I went there that's when I found out they had an educational program. And I thought Oh! I want to work here cause they know it all! And actually they provided training. (Angela, A1:68)

I looked forward to going to the schools where they had teachers training teachers. That had the most impact on me; because, when I signed up for those classes I knew that the teacher that was presenting it has already gone through the experience already knows what works. (Angela, A2:36)

Better environments. It's prettier at RSG and BRIT. It's a better place than just going to some school. (Kevin K2:14)

Being outside. Actually doing it (pause) outside. You know where it's applied to being outside and doing what you're going to teach outside. But you also had some stuff inside to kind of tie those two together. (Kevin, K2:54)

The training that I've always had with RSG has helped me be successful. Because I could get a book and I could read about it and not have the courage to go out there. And when I attended workshops where they provide that experience, where I had I did my own hands-on with the training experience, I felt a little bit more comfortable. It's just the practice of going out there all the time and then finally making it a routine.

(Angela, A3:33)

I don't mean to talk about BRIT and RSG so often, but it made such a huge impact, they've been a big resource for me. And a lot of it is almost like they've given me permission to do some of my lessons. (Angela, A2:84)

A BRIT and RSG funded trip to the Teton Science School was particularly meaningful for Diane and Kevin.

I guess going to the Tetons was really influential in my life and the science school there. (Diane, D1:6)

I was just amazed with the beauty of the land and just being in that place. And then coming back and understanding that we could do things here in our place too.

(Diane, D2:4-5)

One time when I went to Teton science school, we just had a biologist that took us out and walked around with us This guy was wide open to any question and he made you feel like any question you asked didn't matter. He was real excited about everything. He was approachable and he made you feel relaxed and also excited about being there. (Kevin, K1:101)

So I've actually remembered that and thought about it. You know about being friendlier or more open to certain things. (Kevin, K1:104)

Relying on the framework for teacher development from Hammerness et al. (2005) provided a base for the analysis of the voices across the narratives of the participants. These five teachers statements of vision, understanding, tools, practices, disposition, and community further provide a picture of the professional life history of upper elementary science teachers who have been identified as effective within the classroom and OLE. The themes identified within this chapter combined with the

narratives from the previous chapter allow the researcher and reader to construct an understanding of the development of such a teacher.

Chapter 6

Discussion, Conclusion, and Recommendations

Elementary science teachers in the early 21st century work in a system that is characterized by pressures of high stakes, standardized tests and a call to leave no child behind. Classrooms full of children who are culturally, linguistically, and academically diverse require teachers to be experts regarding their science content, curriculum, classroom management, and students' needs. In the constructivist science classroom the teacher creates learning experiences that engage students' prior learning, encourage dialogue, and connect to real-world concepts. Including the OLE as a component to learning in elementary science provides opportunities for real-world, hands-on inquiry experiences for students. How the elementary science teacher acquires the knowledge, tools, and practice of effective teaching and successfully responds to the challenges while incorporating outdoor learning is not well documented. It is important to understand the professional life histories of the teachers who are recognized as effective within the four walls of the elementary science classroom and the OLE.

The varied experiences of teachers make it difficult to form generalized statements regarding teacher development (Bransford, Brown, & Cocking, 2000). Researching the life histories of educators provides the opportunity to make meaning from their narratives of lived experiences. The professional life history of the educator allows the narrative researcher to construct an understanding of the experiences of the effective elementary science teacher. Paradigmatic reasoning used in the analysis of the narratives of the professional life histories of the participants allowed me to construct themes that were evident throughout the stories of experience of five elementary science educators. The

narratives of professional life histories for each of the participants tell stories that are unique, yet the voices from across those narratives reveal themes of teacher development that resonate.

Interpretation of Results

Kevin, Angela, Steven, Diane, and Kathleen tell five unique narratives of professional life history. Here, I intend to rely on narrative reasoning to unify those themes into a hypothetical professional life history of an upper elementary science teacher who is effective in the classroom and OLE. I call this teacher Jenny.

Jenny grew up in a family *community* that encouraged her to wonder and wander. She did some of her wondering and wandering outdoors, encouraged either by her natural surroundings or *community* that enjoyed the outdoors. Her school experiences were meaningful to her. She did not always excel in or enjoy school. Some years were difficult, but she found support from a small group of teachers in the form of positive relationships and encouragement. Those teachers are a piece of the *community* that helped shape her idea of what effective and meaningful teaching looks like.

She may not have always wanted to be an elementary science teacher, but some part of her felt compelled to investigate a career in education. She may have been encouraged by family or inspired by her need to make a difference in her world. Jenny's teacher preparation program had a lasting impact on her. Her courses, whether through traditional or alternative certification, focused on providing Jenny with real-world teaching experience. She was taught the theory and research behind the pedagogy she worked to understand through experiential learning environments and a collaborative *community*. Her classes focused on providing differentiated instruction. Jenny's assignments forced her to *understand* the diverse

classrooms she would enter as a teacher. She *understood* that her students would come from various cultures, speak a variety of languages at home, and have a wide range of learning needs.

Jenny spent extensive amounts of time in elementary classrooms. She began with sessions of teacher observation where she took notes to guide a reflective discussion later with her *community* of classmates and professors. She slowly received more and more responsibility in the classrooms she visited and eventually taught lessons developed collaboratively with her peer *community*. Again, she wrote notes to herself and reflection statements for her professors. She was given opportunities to discuss what went well, what challenged her, and how she could improve her lessons.

To complete Jenny's teacher-preparation she had two student teaching experiences where she was paired with highly skilled supervising teachers. Her supervising teachers provided her with support that allowed her to attend to her practice and let Jenny experience independence and autonomy as the classroom teacher. During her student teaching, Jenny was expected to *understand* the curriculum, plan and deliver lessons through effective *practice*, and manage all the workings of the classroom from attendance to behavior. As with her observations, Jenny took notes to guide reflective conversations with colleagues and professors regarding her experiences. There were times when Jenny felt she was learning on the fly, but she had support from the *community* made up of her supervising teacher, professors, and/or peers.

Jenny's first year of teaching was a challenge. She had a hard time reconciling the fact that she was a college graduate who should be prepared to enter her field yet found there was so much she needed to learn. A *community* of peers was a great resource for Jenny.

Whether they were an assigned mentor or a member of her team, she was encouraged to go to them with questions and to rely on them for encouragement and inspiration. Thanks to her experience in pre-service development, Jenny was very skilled at applying what she observed in other teachers and reflecting on what she did in the classroom.

Administrators throughout Jenny's career played an important role on how she viewed herself as a teacher. Administrator encouragement helped her feel effective while constructive feedback helped her see where she had room to grow. Administrators who responded poorly to the pressures of accountability based on standardized-test data created environments that affected Jenny negatively. Jenny appreciated administrators who were concerned with the well-being of their students as whole children rather than as a test score. Providing feedback that let Jenny know when she was successful is what drove her to do better and exceed her teaching goals for her students.

As a science teacher, Jenny relied on the textbook and any curricular *tools* she was given to help her *understand* the science content she was teaching. She did not feel as informed as she would have liked and began to pursue opportunities to deepen her content *understanding* through professional development. She attended workshops provided by local universities and other organizations that were intensive, experiential, and directly related to what she was responsible for teaching in her elementary classroom. The content she learned was easy to apply in her classroom because the professional development also focused on effective *practice* for science teaching. These experiences allowed her to gain confidence and feel free to begin to develop and manipulate her science curriculum. As she explored new ways to teach science and gained new *tools* for her classroom she began to see the value of attending to her students' experiences. Jenny tried to *understand* the experiences her students

entered her classroom with as well as those she provided for them. As the teachers she considered effective had done, she tried to make learning relevant to her students' needs and conceptions of science by facilitating learning that was rich with student engagement, discussion, and authentic demonstrations of learning.

Jenny was often confronted with leadership opportunities due to her success in science teaching. She worked within her school district developing elementary science curriculum and delivering in-service professional development to other classroom teachers. This allowed Jenny to extend her *community* while she connected with more colleagues and deepen her *understanding* while she continued to learn from her peers and share her knowledge with others. Jenny soon came to be known as the science expert on her campus and became a resource for other teachers.

Jenny has always had a *disposition* to care for the natural environment. Either due to her exposure to nature as a child or adult experiences, Jenny understood the importance of staying connected to her local and global environment. She connected this to her teaching through an intense pedagogical experience where she recognized the value of outdoor learning in children. Inspired by a topic that did not seem to be appropriately addressed indoors, Jenny took her students to the OLE. Seeing her students excited to learn and connected to a real-world, experiential learning experience Jenny saw *vision* of the possibilities of using the OLE to teach.

Unfortunately, OLE pedagogy was not addressed in Jenny's pre-service learning experiences and she realized that teaching in the outdoors required a different skill set than classroom teaching. Through recommendations from administrators or colleagues Jenny was introduced to local organizations in her *community* that focused on engaging teachers with

the outdoors and encouraging them to use the OLE to teach students. Jenny attended several professional development workshops and began connecting with other educators who shared her interest in teaching in the OLE and developed the conceptual and practical *tools* for teaching outdoors. She was active in a pursuit to install a garden on her school campus and worked with her administrators and peer teachers to make the OLE a part of her school's culture and a *tool* for teaching. Eventually, Jenny connected most of what she taught to the OLE. The OLE was a *tool* that allowed Jenny to stretch her students' limited experiences and provide real-world connections to what they were learning. This was one way that she could impress upon her students the need to care for and be aware of the natural environment.

As the culture of high-stakes testing intensified, Jenny saw her district provide more and more directives regarding science curriculum. Her district administers regular, standardized assessments that hope to ensure that all students throughout the district are taught a unified and provided curriculum. Although she sees the benefits of the *tool* of a written curriculum for new teachers, she often feels that her hands are tied and she has less opportunity to respond to teachable moments in the OLE or science current events. Fortunately because her *practice* has resulted in success in the classroom, Jenny's administrators provide her with a level of autonomy that allows her to incorporate her talents as a science teacher in creative ways that are not necessarily part of the prescribed curriculum.

Jenny is not a teacher simply because it is a job with a paycheck. Jenny is a teacher because she was called to be one. She loves her job, her students, and has a *vision* that shows her the possibility to make an impact. It has not been an easy career and it is not without its

negative experiences, but teaching is a part of who she is and she cannot imagine herself doing anything else.

Implications and Recommendations

The implications of this research can be realized for the preparation of pre-service teachers and the development of in-service teachers for both administrators and professional development providers. It is evident from the narratives of these five participants that their experiences in their pre-service development were impactful. What they recall as beneficial was their time in real classrooms engaging in real-world teaching experiences. Learning assignments with tasks that directly related to future demands of teachers were the lessons that continued to influence the participants in their careers. “Learning experiences that support understanding and effective action are different from those that simply support the ability to remember facts or perform rote sets of skills” (Hammerness et al., 2005, p. 370). We, as pre-service educators, can ensure that class time is used to engage our students in activities, assignments, lessons, and assessments that help students construct an understanding of the realities of teaching. Instead of introducing theory and method as distinct categories for pre-service development, we should work to integrate the two and reveal how one informs the other. We should ensure that we provide experiences that are rooted in the demands of classroom teachers who will face diverse students and a myriad of pressures from their school and district administration.

The intense, pedagogical experiences the participants reported regarding use of the OLE to teach could be a part of pre-service education. “Considering the outdoors as an important learning environment, it is clear that teacher training programs and professional development have a great potential in improving the way teachers plan, carry out, and

conclude outdoor learning” (Tal & Morag, 2009, p. 259). As pre-service educators we can facilitate authentic teaching and learning experiences for pre-service elementary science educators in the classroom as well as in the outdoors. Including pre-service methods instruction that focuses on outdoor teaching can establish a starting point for new teachers to build their confidence in science teaching in out-of-classroom environments (Carrier, 2009). Expanding the vision of where science learning can happen early for teachers may increase their interest and confidence in the use of the OLE for science teaching. No matter how intentional and thorough pre-service education manages to be, it cannot be assumed that teachers enter the classroom fully prepared to teach. University and alternative teacher preparation programs, school and district administration, and new teachers themselves should recognize the reality of the amount of growth still required for early-career teachers.

The stories from the five participants in this research indicate that district and school-based administration should be cognizant of the needs of early career educators. Teachers continue to develop a great deal in the first five to seven years of teaching (Hammerness et al., 2005) and the community that surrounds them during that time has a great deal of impact on their development. The community established through peers and mentors was vital for these teachers in their early careers. A community that makes new teachers aware that they are not in a hole, as Angela said, can encourage novice educators to seek the experts in their field for continued growth and learning. The role models they encounter and peer discussions in which they participate can help teachers to develop new visions for teaching and change the status quo (Shulman & Shulman, 2004).

The further development of teachers beyond pre-service years requires sources outside of school and district administration. Professional development providers have

continuously addressed the needs of the five participants in this study throughout their careers. In the decades of combined experience represented by the five participants, it was intensive, forward thinking, and teacher-centered professional development that they recalled as impactful. Professional development providers should attend to teacher needs in areas of understanding, practice, and community. The communities formed within professional development experiences provide opportunities for teachers to enter into a common search for understanding and meaning in their professional lives where they can construct a framework for moving forward (Cochran-Smith & Lytle, 1999). For elementary science educators, the content and pedagogical demands are impressive and teachers will continue to rely on ongoing professional development to help them rise to and exceed those demands.

Limitations

This research is limited due to its size. Researching the professional lives of five individuals does not intend to give information that is generalizable. The five participants included in this study cannot, and should not, be the voice for every effective elementary science teacher who uses the OLE to teach. Yet, their voices and their stories are important and can add to the understanding of the experiences of teachers.

Another limitation of the research is a manner of homogeneity among the participants. The participants do not represent the cultural diversity of their students and are all of a similar age. All five of the participants also have over 15 years of teaching experience. It was not intended for each of the participants to have such extensive experience in the classroom, although it is not surprising that the recruitment of notably effective educators resulted in those with similar classroom experience.

The participants in this research may have been influenced by my personal and historical connection to RSG and BRIT. Participant responses to questions and conversation may have been more positively skewed towards an appreciation of RSG and BRIT based on our shared relationships with the organizations. This means that they may have been hesitant to include experiences with either organization that may have negatively affected them throughout their professional life. The participants may have more heavily weighted their recollection of experiences in their professional life to include RSG and BRIT while failing to include experiences with other professional development or organizations that influenced their teaching. During the interviews, I attempted to encourage the participants to describe experiences while they pretended I did not know about the organizations and to disregard my relationship with them. The reality is that in their minds it may have proven difficult to sever my connection with either RSG or BRIT. I had to consider my own personal experiences with RSG and BRIT as I compiled the narratives of professional life of the participants. I was careful to remain true to their experiences and not my own as I constructed the professional life histories. The use of member checking and use of the actual words of the participants helped me tell their story and not my own.

The participants occasionally tended to more narrowly focus the conversation to the use of the garden. Again, this could be a response to my relationship with RSG or to the research question that they felt most heavily focused on the use of the OLE. To address this, I often asked participants to expand on experiences regarding how their practice as a *classroom* teacher was specifically impacted. I also attempted to encourage participants to describe their use of any part of the OLE, not limited to the constructed school garden on their campus.

Subjectivity is also a limitation of this research. As is the case for many narrative researchers, the time spent with the participants and the depth of the conversations during the interviews resulted in the formation of relationships. Although the relationships were beneficial as I constructed the professional life histories of the five educators, I also had to be cautious to ensure I represented the voices of the participants as they told their stories and not color their professional life histories in a skewed light.

Recommendations for Future Research

The research of the professional life histories of five upper elementary science teachers who are effective in the classroom and OLE has introduced several future research questions that may be addressed. Extensive research has been conducted regarding the impacts of pre-service education on early career teachers. Including more long-term studies that follow teachers through the first three to five years of teaching would be beneficial to understand what parts of pre-service development are the most useful in the early careers of teachers. More research investigating the inclusion of pre-service development that focuses on the use of the OLE for teaching is also needed. Identifying and facilitating opportunities for intense pedagogical experiences for pre-service and/or new teachers regarding the use of the OLE may help to encourage more wide-spread use of the outdoors for science teaching. It also seems important to further investigate the experiences provided by RSG and BRIT through in-service teacher professional development. Since the professional development provided by RSG and BRIT was so meaningful to most of the participants in this study, it is important to understand what the organizations do that may be unique and provide such a level of impact for participants or if instead what is unique is the participants themselves.

APPENDIX A

About Real School Gardens

What is REAL School Gardens?

We Grow Successful Students

For a teacher, a garden is more than a beautiful place or a veggie patch. It is a powerful learning tool, as critical to a student's academic success as a computer or a microscope. To help students succeed, REAL School Gardens creates learning gardens in low-income elementary schools and trains teachers how to use them to improve student engagement and academic achievement.

We Build Learning Gardens

For most schools, the first step is to create the learning garden. Our program unites teachers, parents, funders and the students themselves to design a learning garden tailored to each school's unique needs. Then, in one satisfying day of service, hundreds of volunteers come together to create a beautiful place for children to learn and grow.

We Train Teachers

After the garden is built, our partner schools enter a multi-year training and support program. Our seasoned and certified educators provide on-site one-on-one training with teachers during class, sharing proven techniques tailored to each teacher's individual needs. We also develop ready-to-use lesson plans that are easy for teachers to implement and provide new activities and garden materials to help them succeed.

REAL School Gardens = REAL Results

Our partner schools have seen 12%-15% increases in standardized test score pass rates. The improvements are particularly noticeable in Science, a critical indicator of long-term career success. Our program is proven to make teachers more effective and get students more engaged in learning. School gardens also make children happier and healthier, giving children a space to build skills and habits that last a lifetime.

Visit www.REALSchoolgardens.org

Training REAL Teachers

A REAL school garden is an important educational resource, as critical to student success as a library or computer lab. To make sure our gardens produce REAL results, we provide every school partner with years of multifaceted teacher training and support.

Curriculum

Our accredited team designs an extensive multi-subject curriculum around the latest academic standards. We provide easy to use lesson plans for elementary grades that engage students in learning subjects from Science and Math to Language Arts.

On-site Trainings

Our expert educators regularly visit partner schools and take whole classes out into the garden, working side-by-side with the teacher and modeling effective outdoor teaching techniques. This REAL-world hands-on approach is proven to boost teacher effectiveness.

Multi-school training

We also host regular multi-school training sessions to share new lessons and teaching methods. Teachers discuss trends they've seen, build their professional network, and return to school to pass along what they've learned with other educators.

REAL Results

- 2,700 teachers trained – Our educators have trained more than 2,700 teachers in a REAL school garden
- 91% better prepared -- 91% of teachers report that the REAL School Gardens program made them better prepared to help their students succeed.
- 100% job satisfaction increase -- Educators in the REAL School Gardens program reporting they were satisfied with their position increased more than 100%.

Visit www.REALSchoolgardens.org

APPENDIX B

Contact Emails

REAL School Gardens Educator Contact

November 1, 2013

Dear [Recipient Name],

I am writing to request your assistance in completing a research study I am conducting.. The purpose of this study is to investigate the narratives of the professional life history of upper elementary teachers who successfully facilitate effective science teaching both within the classroom and in the outdoor learning environment.

From your experience with educators within the REAL School Gardens network of schools, are there any upper elementary (grades 3-5) science teachers who you feel demonstrate frequent use of the outdoor learning environment for instruction that is integrated with regular science curriculum goals? If you wouldn't mind taking a few moments to consider this and submit a list of names and schools to me electronically, I would greatly appreciate it. Should you have any questions, please do not hesitate to ask.

Thank you for your time and your help.

Sincerely,

Kelly Feille
Doctoral Candidate – Science Education
Texas Christian University
T: 817-832-6978 E: k.k.nelson@tcu.edu

Principal Contact

[Date]

Dear [Recipient Name],

I am writing to request your input regarding a research study I am conducting for my dissertation. The purpose of this study is to investigate the narratives of the professional life history of upper elementary teachers who successfully facilitate effective science teaching both within the classroom and in the outdoor learning environment.

I would like to schedule a time to have a brief phone call with you to solicit any recommendations you have for upper elementary (grades 3-5) science teachers who demonstrate the qualities of an effective teacher in the classroom and the outdoor learning environment.

If you feel you could be of help, please respond with a time that would be good for me to contact as well as your best, contact phone number.

Thank you for your time and consideration.

Sincerely,

Kelly Feille
Doctoral Candidate – Science Education
Texas Christian University
T: 817-832-6978 E: k.k.nelson@tcu.edu

Participant Contact

[Date]

Dear [Recipient Name]

You were recommended to me as an educator who is qualified to and may be interested in participating in a research study that I am conducting. The purpose of this study is to investigate the narratives of the professional life history of upper elementary teachers who successfully facilitate effective science teaching both within the classroom and in the outdoor learning environment.

I would like to have the chance to talk with you about your experiences that you feel have contributed to your success as an educator within the classroom and in the outdoor learning environment. I would like to meet with you at times and locations that are convenient to you three times over the next couple of months.

Your participation in the research is completely voluntary and all your responses will remain confidential. No personal information will be shared with your community or supervisors and will only be used to further my research study. You will have an opportunity to review my writings to ensure I have respected your position and ideas.

If you are interested in participating in this research, please contact me via email at k.k.nelson@tcu.edu by [Cut off Date]. I will then notify you regarding the research by [date]. Thank you for your consideration and I look forward to hearing from you soon!

Sincerely,

Kelly Feille

Doctoral Candidate - Science Education

Texas Christian University

T 817-832-6978 E k.k.nelson@tcu.edu

APPENDIX C

Interview Questions

Kevin interview two

Tell me a story about a time the curriculum (frameworks or testing) has been a factor in your classroom teaching. Either positive or negative.

Can you tell me a story about a district training that stands out as impacting your teaching?

You've been teaching long enough to see some pretty significant changes in education. Have there been legislative changes at the state or national level that stand out to you?

Last time you mentioned the RSG trainings, pretending I don't know, talk to me about the nature of those trainings? What about them made them successful in your opinion?

You weren't trained in science before you started teaching. How did you develop your science content understanding?

Is there anything I haven't asked you about that you think is important?

Angela interview two

Can you tell me about any relationships with peers or administrators that you think impacted you as a teacher? Positively or negatively.

You talked about your courses in college being textbook/lecture and theory based. So, think back if you can to those early years of teaching, what helped you know how to teach?

You talked a lot about seeking out trainings for both science classroom and outdoor teaching. Think of a memorable experience from any of those and talk to me about it.

You've been teaching long enough to see some significant changes in education.

What is something that has made a difference in your teaching? (+ or-)

You weren't trained in science before you started teaching. How did you develop your science content understanding?

Anything I haven't asked that you think is important?

Steven interview two

Talk me through the process of transitioning to this campus. You mentioned you wrote your job.

The community involvement with the campus, is that something that is fueled by you or someone else?

You talked about working for the district, can you tell me more about influences to get you out of the classroom?

You also talked about leading workshops, why is that something that interests you?

You've seen some different changes in education from the district to national level, how have any of those impacted you or your teaching.

You said your first push towards this profession was through the Idea of working with troubled kids as a counselor. How has that initial draw to the profession been realized in your career?

Is there anything I haven't asked that you'd like to tell me about?

Diane interview two

Last time you commented you'd taught through breast cancer and that teaching probably saved your life. I'm wondering if you could elaborate.

You mentioned the trip to the Tetons last time-Pretending I haven't been, can you tell me about the trip and why it left such an impression with you?

You have been teaching long enough to see some major changes in education. How have any of those changes affected the way you teach?

What about district initiatives like the curriculum framework and curriculum based assessments. Are those implemented here like they are across the district?

Can you clarify about your experience teaching reading in college?

Is there anything I haven't asked you about that you think I should know?

Kathleen interview two

Can you talk more about the experience while working as an educator at Sea World that helped you become passionate about education and teaching?

Can you talk about any experiences at professional developments that impacted your teaching?

Does the garden on campus have any impact on what you think about teaching? How is it incorporated into your job and what role does it play?

You have been teaching long enough to see some major changes in education. How have any of those changes affected the way you teach?

Interview three questions

What was the most impactful about your student teaching experience?

How have you been a leader in your school and/or district? How has that impacted your teaching?

If you could attribute your success as a classroom teacher to one thing, what would it be?

If you could attribute your success as a teacher in the OLE, what would it be?

If I asked you to design an ideal teacher preparation program, what would you be sure to include?

Can you describe a moment or experience where you were able to say to yourself, 'I am good at what I'm doing'?

Why do you still teach?

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ABSTRACT

INVESTIGATING THE PROFESSIONAL LIFE HISTORY OF UPPER ELEMENTARY TEACHERS WHO SUCCESSFULLY FACILITATE EFFECTIVE SCIENCE TEACHING BOTH WITHIN THE CLASSROOM AND IN THE OUTDOOR LEARNING ENVIRONMENT.

by Kelly Kathleen Feille, PhD., 2014
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This research investigates the professional life histories of upper elementary science teachers who were identified as effective both within the classroom and in the outdoor learning environment (OLE). The narratives of five teachers collected through semi-structured and open-ended interviews provided the data for the study. Professional life histories were constructed for each teacher participant and an analysis of the teacher narratives identified the themes of teacher development across the voices of the participants. These primary themes were based on a framework for teacher development by Hammerness et al. (2005) that posits that teachers develop within a community where they construct a vision for their practice; understandings of teaching, learning, and children; dispositions about how to use their knowledge; practices that bring together their intentions and beliefs; and tools to support their work. Implications of the research can be realized for stakeholders in the preparation of pre-service teachers as well as the development of in-service teachers. Future research regarding the early induction years of new teachers, impacts of inclusion of the OLE in pre-service teacher instruction, and teacher experiences regarding professional development relating to efforts to include the OLE in formal education should be investigated.